

THE GARDENER'S ASSISTANT

WILLIAM WATSON



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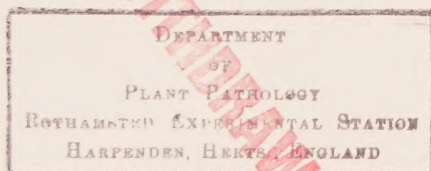
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SINGLE CHRYSANTHEMUMS

Flossie (single white): Mary Morris (bronze): Mrs. Loo Thompson (yellow)

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THE GARDENER'S ASSISTANT

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VOLUME V

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VOLUME V

POPULAR GARDEN PLANTS

The Achimenes.—These beautiful and free-flowering plants are useful for the summer decoration of conservatories, &c. Most of the favourite sorts are of hybrid origin, having been raised from species introduced principally from the warm regions of South America; consequently they will bear a considerable amount of heat, though in the summer, when they flower, they may be placed in a house without artificial warmth, provided they are not exposed to currents of cold air.

They should be started into growth in February or March, in pots or pans filled to within $1\frac{1}{2}$ inches of the rim with fine sandy soil, placing the tubers 1 inch apart, and covering them over with a little soil. A temperature of about 65° suits them. When the stems are two inches long they may be potted into 8- or 10-inch pots or pans, in a soil composed of three parts good fibrous loam, two parts sifted leaf-mould, and a moderate sprinkling of sand. A shelf near the roof-glass in a warm house is a good place for them. When the stems are 6 inches long, pinch out the points so as to induce a branching habit. In all stages of their growth they must be well supplied with water.

When the flower-buds are formed, give manure-water two or three times a week, and harden the plants off until when in flower they may be transferred to the conservatory. When the stems have died down, the tubers may be kept in dry sand in a temperature of about 50° for the winter; or, if room can be spared, they may be allowed to remain in the pots, in which way they generally keep the best. Planted in wire-baskets lined with sphagnum, and some of the plants put in so as to grow through the

bottom and sides of the baskets, they are very effective when suspended in a conservatory.

They multiply themselves most prolifically by means of their worm-like scale-clothed tubers. They may also be raised from seeds sown in early spring and treated as Gloxinias.

There are numerous named sorts, some of the best being the following:—

Admiration, red.
Alba maxima, white.
Aurora, red.
Celestial, mauve.
Coccinea, scarlet.
Firefly, crimson.
Grandis.
Longiflora, blue.

Margarita, white.
Masterpiece, purple,
white throat.
Mauve perfection.
Rosy Queen.
Scarlet perfection.
Splendens, scarlet.

Anemone (Wind-flower). — Several species of this large and useful genus have long been favourite florists' flowers, and they have consequently developed a considerable range in variety of colour, size, shape, &c. The oldest species is the Poppy Anemone (*A. coronaria*), which has been a garden plant for the last three centuries. It requires a rich, deeply-dug soil, light rather than heavy, and well-drained. Some growers place a layer of cow-dung a foot below the surface of the soil for the roots to feed on when growth is vigorous. The bed should be raised a few inches above the ground level. The tubers, which are dry and shrivelled as obtained from dealers, are best planted in September, except in cold wet districts, where it is advisable to defer planting until February, the danger from early spring frosts being thus avoided. The tubers should be planted 2 inches deep and 9 inches apart, and the bed kept clear of

weeds. A mulching with fine decomposed manure and leaf-mould should be given in early spring, as it helps to keep the soil moist in summer. The beds must be watered freely in dry weather. Early in August the plants show signs of ripening by the foliage turning yellow; the tubers should then be lifted with some earth attaching to them, and stored dry for planting another season. Seedlings can be raised from the best varieties. The seeds should be sown as soon as ripe in a box of sandy loam and leaf-mould,

loamy soil, and kept in a sunny cold frame all winter. They usually flower in March or April. Other varieties worth growing are *stellata* and *pavonina*.

A. japonica (the Japanese Wind-flower) and its varieties flower in late summer and autumn. They are perennial, perfectly hardy, succeeding in any good garden soil, and in almost any position; growing and blooming abundantly when given generous treatment. The type is about 2½ feet in height, with large rose-coloured flowers, semi-double, and very handsome. The variety *alba* (fig. 2) or Honorine Jobert is taller in growth, and has pure-white, quite single flowers; Lady Ardilaun, also pure-white, has



Fig. 1.—*Anemone hortensis* (vars.)



Fig. 2.—*Anemone japonica alba*

distributing them thinly over the surface, and just covering them with soil. Over this lay a covering of moss, and place the box in a cold frame; the seeds germinate in about a month, and the seedlings, if planted out in the autumn, should bloom the following spring.

A. hortensis (fig. 1) is best known by its beautiful variety the scarlet Wind-flower, popularly known as *A. fulgens*. It is not always happy in the open air in England, but in sheltered situations where the conditions are favourable its rich scarlet flowers produced in May are a brilliant picture. It likes the same sort of soil as *A. coronaria*, and should be transplanted in the autumn. A few patches of it in the rock garden are effective. It is also useful as a pot plant for the conservatory. For this purpose the tubers should be potted in autumn rather thickly in 6-inch pots of good

larger flowers and bolder foliage. Whirlwind is white, semi-double, and a striking border plant. *Rosea* or *hybrida* has pale rose-coloured flowers. All the varieties are propagated with great readiness from pieces of the root-stock. They are most useful plants for the border, and for beds on lawns.

Antirrhinum (*Antirrhinum majus*, fig. 3).—The great Snapdragon, originally introduced from the shores of the Mediterranean, is now abundantly naturalized in this country. It also ranks among the most popular and showy of our hardy summer and autumn flowers, having been improved by cultivation in size, shape, and flower-colour, as well as in the height and habit of the plant. With liberal treatment it has been known to reach a height of 7 feet, by 5 feet in dia-

meter. There are now three distinct strains, namely: tall, some 3 feet in height, specially useful for large beds or for the mixed border; intermediate, about 18 inches high, very popular for summer bedding, as they can be had in a variety of colours which breed nearly true from seed; dwarf, or Tom Thumb, about 6 inches high, useful for small beds or as an edging for beds and borders.



Fig. 3.—*Antirrhinum* (tall variety)

Seeds sown in February, thinly in pans or shallow boxes of light sandy soil, and placed in a gentle bottom heat, soon germinate. When large enough to handle, the seedlings should be pricked off into boxes, and again into cold frames, where they can get plenty of air. They should be transferred to their flowering quarters in May.

Snapdragons are most effective when planted in a bed, a number of varieties together. They grow in any good garden soil, but heavy loam should be lightened

by the addition of humus, road-grit, &c. A friable yellow loam is best, and it should be deeply dug and manured, and, previous to planting, a good dressing of leaf-mould should be forked into the bed. The plants should be 18 inches apart. They must be regularly watered in dry weather. Good varieties should be marked for propagation by means of cuttings. To maintain the effectiveness of the bed, all the flower-spikes should be cut away as they fade, leaving a few on any fine varieties for seeds. Thus treated, the plants will continue to flower until cold weather stops them.

Cuttings of young shoots soon strike if taken from the base of the plants in July or August and inserted in pots or pans in a cold frame. They should then be potted off singly into small pots to winter, and kept in a frame till spring. Another method is to put a few old plants into gentle heat in spring and cause them to put forth growths, which can be struck in bottom-heat in the same way as *Verbenas* and *Fuchsias*.

Such fine displays of this popular flower are now produced from seeds saved from a good strain, that the naming of varieties has ceased to be necessary.

Aster.—The United States of America may be taken as the head-quarters of this genus, which contains about two hundred and fifty species, one hundred and fifty of which are natives of that country. The rest are scattered over Europe and Asia, some of the most showy being found in the Himalaya.

The section known as Michaelmas Daisies contribute the great bulk of the kinds grown in gardens, and, flowering as they do late in the year, they are valuable plants.

The facility with which the species hybridize has resulted in a great number of garden forms, in fact most of the varieties grown are the offspring of not more than twenty species. Besides being indispensable as border plants for autumn display, and for cutting purposes, they are very effective when planted amongst shrubs. Although there is no great diversity of colour in the genus, the species vary much in habit. Some of the garden sorts are worth an entire bed in a conspicuous position on the lawn, and if allowed plenty of room, and their shoots are thinned out, they make a grand display in October.

The cultivation of *Asters* is not difficult. They should be taken up and divided early in spring, just when fresh shoots are showing, selecting pieces from the outside of the clumps for replanting, the middle nearly

always being exhausted. They like a deep well-manured soil, although many will grow under conditions far less favourable.

The following are the cultivated species:—

A. acris.—Early-flowering, very free, forming a mass of blue $1\frac{1}{2}$ to 2 feet high. A dwarf form, *nanus*, is suitable for the rockery.

A. Amellus.—Early, sturdy, and dwarf, good for beds or the mixed border. Flowers purple-blue, large; disc yellow.

A. cordifolius.—Graceful, about 4 feet high; flowers in dense plumes, late in autumn. Grows well under trees or amongst shrubs if the situation is not too dry. See list below.

A. diffusus.—Has tall arching stems and white flowers; the variety *horizontalis* is dwarf and bushy, with horizontal lateral branches, and an abundance of red and white flowers.

A. ericoides.—Shoots 3 feet high, slender, with linear leaves, and white flowers.

A. grandiflorus.—Stems much-branched, 3 feet high; flowers bright-purple, produced in November or December. Requires a sheltered position. A good plant for pot-culture.

A. laevis.—This and *A. Novi-Belgii* are the parents of many garden forms. The former is about 2 ft. high, and has oblong shining green leaves, and blue flowers.

A. Novæ-Angliæ.—Stems tall; leaves linear lanceolate, hairy, stem-clasping; flowers purple, in terminal clusters.

A. Novi-Belgii.—Stems 4 feet high, branched; leaves lanceolate, smooth; flowers pale-blue.

A. paniculatus.—Stem 4 feet, branched; leaves ovate lanceolate, stalked, smooth; flowers light-blue.

The following is a list of the best garden hybrids and varieties, under their respective parents:—

Amellus.—Varieties: Beauty of Ronsdorf, Bessarabicus, Framfield, King George, Perry's Favourite, Riverslea, Roseus, Surprise, Ultramarine.

Cordifolius.—Albus, Dandy, Diana, Elegans, Ideal, White Diana.

Ericoides.—Blue Star, Chastity, Golden Spray, Edith Gibbs, Maidenhood, White Heather.

Novæ-Angliæ.—Lil Fardel, Mrs. J. F. Raynor, Pulchellus, Purpurea, Roseus, Ruber.

Novæ-Belgii.—Beauty of Colwall, Brightest and Best, Climax, Cloudy Blue, Elsie Perry, Feltham Blue, Henry Adams, Mrs. H. Morris, Robert Parker, St. Egwin, Well's White, White Climax.

Smaller-growing species, suitable for the rock garden, are:—

A. alpinus, the mountain Aster, and its rose and white-coloured varieties.

A. diplostephioides.—From the Himalaya, with rich bright-lilac flowers, 4 inches in diameter, borne singly on long stems.

A. Stracheyi.—A miniature gem with purple-blue flowers.

A. Thomsoni.—A neat compact plant, the flowers being large and pale-lilac in colour.

The China Aster is properly a *Callistephus*, which see (Vol. IV, p. 180).

Auricula (*Primula Auricula*).—One of the oldest of garden flowers. In Gerarde's *Historie of Plants*, published in 1597, eight varieties of "Beares Eares" are figured and described, some of them being varieties of the Auricula, whilst others are not. According to Parkinson, the Auricula must have been a favourite garden flower in his time (1629-40). In the *Paradisus* he describes twenty-one varieties, their colours being "purple, tawny, blood-red, violet, blush, scarlet, rose, white, yellow, hair-coloured, and yellowish-green with purple edge". Philip Miller, in his *Gardeners' Dictionary*, published in 1733, says of the Auricula: "To enumerate the diversities of this plant would be almost endless and impossible, for every year produces vast quantities of new flowers, differing in shape, size, or colour".

It is generally believed that the progenitor of the garden Auricula is *Primula Auricula*. We can easily trace the yellow and buff selfs of the early writers breaking into the flakes and stripes of the *Flora Exotica* of Count Dermatt, the green edge of Painted Lady Diamond, and the white edge of Honour and Glory. The origin of the black and purple-coloured forms is not so clear, but it is probable that the purple-flowered *P. venusta* has played some part in their evolution.

The parents of the Alpine Auricula (fig. 4), cultivated by Carolus Clusius in Vienna as early as 1582, would appear to be *P. Auricula* and *P. pubescens*, the latter a natural hybrid producing rosy-crimson flowers.

Hogg's *Treatise on Florists' Flowers*, published in 1824, mentions ninety-three varieties of edged Auriculas and thirteen selfs; but no distinction is made between the green, grey, and white edges. This has been done in more recent years, the show Auriculas being divided into four well-marked divisions—viz. green-edged, grey-edged, white-edged, and selfs. The Alpine Auriculas as florists' flowers are divided into white-centred and yellow-centred varieties.

The characters of these are as follows:—

Green-edged.—Leaves invariably green. Flower-tube yellow, the anthers hiding the pistil. The limb or radiating part of the corolla is densely coated in the centre with a white farina or powder called "paste"; next to this is the ground colour, a violet, purple, or deep-maroon, in some instances a blue-black or a purple-black; the inner margin of this ground colour should form a perfect circle around the white paste, the outer margin being more or less irregular. The edge should be of a lively green colour as free from

paste as possible. A pale-coloured tube or angular paste are serious faults.

Grey-edged.—In this section the outer edge only is green, but so thickly powdered that the green is scarcely discerned. Grey-edged varieties are easier to obtain than either white or green. The best grey-edged is George Lightbody, which is a model of what an edged Auricula ought to be. Lancashire Hero is also very good.

White-edged.—These are distinguished from the grey merely by the denser coating of farina on the margin, which in some instances is as pure and clear a white as the centre.

Selfs.—These, as the name suggests, have a uniform colour surrounding the white centre; this colour should be uniform throughout.

as they require it. A suitable potting material is yellow loam four parts, leaf-mould one part, and decayed manure one part. Should the seeds sown in July not all vegetate in the autumn, they will remain dormant until February, when seedlings should appear freely. Seeds sometimes lie for twelve months before germinating.

Offsets, although generally freely produced by mature plants, sometimes will not develop on one for years. They must be carefully removed from the parent plants with a small portion of roots attached,



Fig. 4.—Alpine Auricula

Cultivation.—Auriculas are propagated by seeds and offsets, the former to obtain new varieties, and the latter to increase the stock of any particular variety.

To raise new varieties, select only the best varieties as breeders. The seed-bearer should have plenty of vigour and a good habit. Remove the anthers with a pair of sharp-pointed scissors before the pollen is ripe. This is necessary to prevent self-fertilization. The pollen parent should belong to the same section as the seed-bearer. The seeds ripen in July, and ought to be sown at once in pans, which should be placed in hand-lights on the north side of a wall as being the coolest place at that time of year. The seeds will begin to vegetate in about three weeks, and the seedlings may be pricked out as soon as the first true leaf is formed, about a dozen or so into a 3-inch pot; they are then potted on singly

planted separately in a small pot in sandy soil and placed in a hand-light until they become established, when they may be repotted. They take at least twelve months to grow into strong flowering plants.

The growing season of Auriculas is from February till June; active vegetation is then suspended till the beginning of August, when it is resumed, continuing till about the middle of October, from which time till February the plant remains in a state of rest. With regard to treatment no directions are more reliable than those of Dr. Horner, who says: "The pots for a full-sized plant should not exceed 4 inches at the top and 3 inches at the bottom, inside measure; they should also be made 5½ inches deep, to allow of abundant drainage, and should not be hard-baked, but left as porous as possible. It is a great and almost universal fault to use pots of too large a size. The

best time for potting is immediately after the plants have bloomed; for, on account of the long previous confinement in the frame, the frequent waterings, and the excitement of blooming, the Auricula is very apt to contract disease, especially rot or decay in some part of the main or tap root, as it is called. This, in repotting, is at once detected, and consequently the life of the plant saved. Moreover, by early potting ample time is given for the pot to get well filled with young healthy roots before the approach of winter—the great secret of a vigorous bloom the following spring; *neglect of yearly repotting is a great evil.*

“The important operation is thus performed: First, put at the bottom of the pot at least $1\frac{1}{2}$ inches of crocks of broken garden pots; on these place a thin layer of decayed leaves unbroken up, which will prevent the soil from filling up the interstices between the crocks, and, moreover, furnish a most acceptable nidus for the roots of the plants. Next, fill up the pot within about 2 inches or so with the compost, leaving it slightly cone-shaped; on the top of the cone put a little sand, on this place the end of the tap-root, and, having disposed the roots regularly over it, let the pot be filled nearly to the brim, so that the soil just covers the insertion of the lowest leaf. Now strike the pot smartly two or three times on the ground, and then remove it to its summer quarters, when water must be given just sufficient to moisten the soil, and repeated at the end of a week, not before. In filling the pot with compost I always put in about three fingers’ full of decayed or rather decaying leaves, not leaf-mould—a pinch here and there. In repotting the following year an unusual mass of roots will be found surrounding and piercing them through and through; they at once afford most acceptable nourishment and drainage. Previously to the operation of potting, the plant must be prepared by carefully crumbling off the old soil with the fingers and then washing the roots in water, in order that any decay or disease may be detected, in which case it should be effectually cut out with a sharp knife, and the main root should then be shortened to within 1 inch of the leaves, leaving only the young and new fibres or roots. One great and fatal cause of the dwindling and disease of Auriculas is the leaving too long a tap-root; it will most assuredly decay and kill the plant. When it is desired to save seed, the operation of potting must be delayed till August.

“The summer situation of the Auricula is all-important. As it naturally delights to grow in open and elevated regions, as on the Alps, so its place and position in the garden must be comparatively high and of free exposure. The pots should stand on planks, which are raised 2 feet from the ground, and placed by the side of a wall or hedge having a north-east aspect, and without awning or covering. Here they may be safely left till November; for if they are annually repotted, properly trimmed at the root, have sufficient drainage in the pots, and if due attention, moreover, be given to them from time to time (as by carefully twisting off decayed leaves, stirring the surface soil occasionally with the point of a knife), the much-talked-of rot need not be dreaded; but if these directions as to potting, just described, have not been followed, and the plants have not been elevated on planks the required distance from the ground, and consequently left in the usual susceptible state of disease, by all means let a temporary awning be erected over them if the summer prove wet.

“In November they may be placed in the frame, giving them all the air possible, as by letting down the front lights and opening the door behind—the top lights being kept on in case of rain. Watering must be gradually withheld, so that during December and January the soil be just kept from being absolutely dry; if it be kept over moist, the plants will be in great danger of contracting disease and of suffering from frost. In winter, during intense frost the frame must be protected with efficient covering; two stout blankets, with an outer coverlet of tarpauling, I have found the best, and, in the end, the cheapest materials. If not protected from severe frost, many of the spikes will be flowerless or with only two or three pips at the blooming time. In winter, during milder days the plants should have sufficient air.

“About the end of February, and during March, they must have plenty of air and also be exposed to frequent gentle showers: nothing is so invigorating. They must now also be top-dressed with a compost of two parts cow-manure and one part loam, having previously removed the old soil to about the depth of an inch. At the beginning of April, when they have pushed up their flower-stems, they must not longer be exposed to showers of rain, but the soil must, to the end of the blooming season, be preserved in a moist state. As the pips, if frosted

when about to expand, will never bloom flat, the frame must be carefully protected, as just described, every night. In watering the plants care must be taken not to wet the foliage; and if a drop has accidentally fallen into the crown of the plant it must be extracted by means of a camel-hair pencil, or decay will probably be induced. A small watering-pot, with a spout $1\frac{1}{2}$ feet long, bent at the end, and then contracted to the diameter of a goose-quill, should always be used.

"When the pips are just expanding into bloom, the frame, which has hitherto been exposed to a southern aspect, should be removed into the shade; or, what is more feasible, the plants may be placed under hand-glasses in a calm and shaded part of the garden, air being admitted at the bottom. The best plan, however, is to remove the plants into a common garden frame, placed in a shaded part of the garden, with the benefit of two hours' morning sun. The pots are not placed on the ground, but on shelves, graduated according to the fall of the glass lights. Slide-doors are made in the front and back of the frame, by which means any quantity of air can be admitted freely, to circulate around the bottom, sides, &c., of the pots and plants; it is most injurious to admit air in the common way, by tilting up the glass lights, as the cold air is thus suffered to blow directly upon the expanding blooms; hence the very great advantage of the contrivance just described. As the pips expand, the smallest, least perfect, and overcrowded ones must be carefully thinned out, leaving a truss of five, seven, or nine. When in full bloom, the plants may be removed to a cool, airy greenhouse, where they can be conveniently seen and examined."

From May until January the flowering plants should be under a north wall, and then in a slightly-heated house, where they may develop their flower trusses. If kept in frames, they must be covered with mats at night and uncovered again in the morning.

Auriculas are often infested with green-fly. This can be destroyed by tobacco fumigation or removed with a soft hair-brush dipped in tobacco-powder. A woolly aphis (*Trama auriculæ*) sometimes attacks these plants, and is not easily destroyed. Tobacco-powder will kill those insects that cluster about the neck of the plants above-ground, whilst those on the stem underground must be removed when the plants are repotted.

Auricula fanciers who grow for exhibition will find that the plants require very careful handling to get them on the exhibition table in good form. Only one truss should be allowed on each plant, and this should be supported with a neat stick.

Alpine Auriculas, when grown in pots, are treated very much the same as the show section. As hardy plants for the rock garden they are most useful, and they are effective

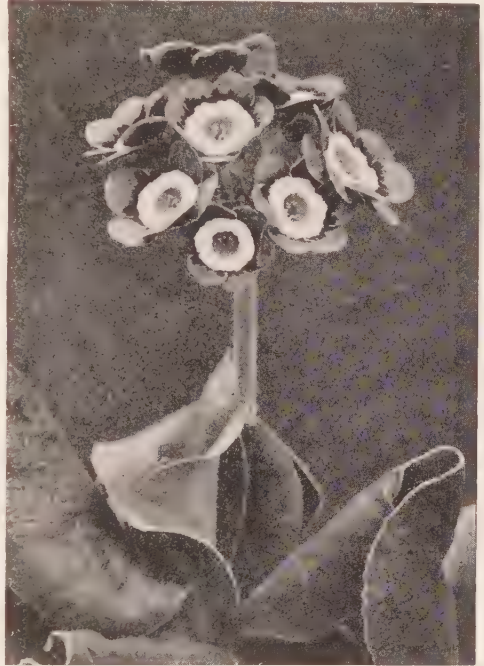


Fig. 5.—Auricula—William Smith (green-edged)

in the flower border, standing the winter out-of-doors in a well-drained loamy soil. Plants established in the rock garden for ten or fifteen years, receiving no other attention than a dressing of rich soil every spring, have produced scores of trusses annually.

Show Auriculas are also quite hardy, but as their flowers, and sometimes the leaves also, are thickly coated with farina, a shower of rain is apt to disfigure them.

Selection of varieties in each section:—

Show Auriculas

Green-edged.—Abraham Barker, Diomed, Dr. Hardy, James Hannaford, Mrs. Henwood, Prince Charming, Rev. Francis D. Horner, Rifleman, Shirley Hibberd, William Smith (fig. 5).

Grey-edged.—Colonel Champneys, George Lightbody, George Rudd, Lancashire Hero, Marmion, Mrs. Moore, Olympus, Richard Headly, Ringleader, Sherwood, Silvia, William Brockbank.

White-edged.—Acme, Beauty, Bellona, Conservative, Dent Blanche (fig. 6), Frank, Guy Cranfield, Heatherbell, John Simonite, Lady Sophia Dumaresque, Miss Prim, Princess May, Wild Swan.

Selfs.—Canary Bird, Daffodil, Dorothy Cutts, Favourite, Harrison Weir, Lady Veitch, Lord of Lorne, May Day, Mikado, Mrs. Potts, Ruby, Rev. Charles Kingsley.



Fig. 6.—Auricula—Dent Blanche (white-edged)

Alpines

Gold Centres.—Brilliant, Claude Halcro, Dean Hole, Duke of York, Ettrick, Firefly, Kaffir, Mrs. Markham, Mrs. Parton, Muriel, Rosy Morn, Uranie.

White, with Cream Centres.—Admiration, Blue Jay, Bonnie Lass, Dazzle, Janet, J. F. Bennett-Poe, Miss Berkeley, Mrs. Douglas, Prince of Tyre, Phyllis Douglas, Roxborough, Teviotdale.

Azalea indica.—The greenhouse or Indian Azalea has a history analogous to that of the Chrysanthemum in regard to its introduction, cultivation, and improvement in Europe. In the *Botanical Magazine*, t. 1480 (1812), it is figured and described as “a very rare plant, which has been long anxiously sought for by cultivators of curious and scarce exotics. We believe there are not above three or four individuals of it in the

country, and of these only the one in the collection of James Vire, Esq., from which our drawing was taken, has as yet produced any flowers.” In the same place it is stated that Kaempfer enumerated twenty-one varieties cultivated in Japan, including white, red, yellow, purple, and scarlet, with spots of the most contrary hues. Fortune says of this species: “Every mountain and hill in the central and southern provinces of China is covered with these beautiful plants. They are like our own Heaths, and quite as abundant. By far the finest are cultivated in gardens, indeed it was only in gardens that I could find any worthy of introduction into England.” The Dutch cultivated *A. indica* in 1680, but soon lost it, and it was not reintroduced until the beginning of the nineteenth century. Knight, of King’s Road, Chelsea, purchased in 1833 five varieties, one double-flowered, two reds, and two large-flowered, from a sailor who had brought them from China. Low & Co. advertised twenty-one named varieties in 1841. Since then the French and Belgian gardeners have crossed and selected these Azaleas with really wonderful results.

A. amœna, *A. obtusa*, *A. calyciflora*, *A. Kurume* (fig. 7), are varieties of *A. Kæmpferæ*, a Japanese alpine species. They are all hardy in the south of England. Of the last named there are numerous colour varieties of recent introduction. In some parts of England the old white *A. ledifolia* is hardy.

Propagation.—Azaleas can be raised from seeds sown as soon as ripe in well-drained pans of finely-sifted peat and sand, placing them in a brisk heat and shade. As soon as the seedlings are large enough to handle prick them out in 6-inch pots of sandy peat soil, keeping them in these nursery-pots until they get several leaves each, after which pot off singly in 3-inch pots, in sandy peat, and place them in a warm, moderately moist atmosphere, where they will have sufficient light to keep them stout and robust. When they have grown 4 or 5 inches high, nip out the points. The generally adopted method of propagation, however, is that of grafting, using as a stock the common white, or the variety called Sir C. Napier. In recent years Hexe, a free-growing variety, has been largely used. German growers use *Rhododendron*, Cunningham’s White, as a stock for the production of standard plants. All that is necessary is to have the shoots of the stock and the grafts in a similarly half-ripened condition; remove the leaves at the point

where they are to be joined, and splice-graft them. Place them in a shaded propagating-frame or under bell-glasses in a temperature of about 65° , and in a few weeks they will unite, when the ligatures must be taken off, keeping the plants growing, and stopping them early to cause them to break. The operation may be performed any time during the spring and summer, so that the grafts will have time to take before the short days arrive. It will be advisable to keep the plants through the winter in a temperature of 50° during the night, so that

in either light loam or peat, but the latter is much the best. It should be rich and fibrous; hard peat, such as is found where wild heather exclusively grows, is not good for them. As the plants get large enough to occupy 5-inch or 6-inch pots, use the peat in a more lumpy state than is required for them in their earliest stages. A sufficient quantity of sand must be used, one-sixth part will not be too much, mixing it well before use. Drain the pots well, as Azaleas cannot possibly be kept in health if the soil gets at all waterlogged. They do not require



Fig. 7.—Azalea Kurume

they may go on growing slowly; for if allowed to go to rest in a cool house they will lose many of their leaves. Large plants of inferior kinds, if their roots are in a healthy condition, may be grafted in the way described, putting on as many shoots as desired. Previous to this the shoots of the stock should be well thinned out to a few above the number it is intended to graft. After grafting, treat them as recommended for the small ones. Azaleas increase freely from cuttings of the half-ripened wood in silver sand in a brisk heat; but, unless for the propagation of stocks, it is not desirable to grow them from cuttings, as they rarely do so well as grafted plants.

Soil and Potting.—Azaleas can be grown

so much root-room as many plants. After they have got sufficiently large to occupy 12-inch or 15-inch pots, they will not need a shift oftener than once in two or three years; and when in 18-inch or 20-inch pots they can be kept even longer in a vigorous healthy state without more room, by the occasional use of liquid manure when growing. The best time to pot is about a month after their blooming is over, as before this their roots are not sufficiently active. In potting, the soil must be made quite solid by a free use of the potting-stick. The soil-ball of unhealthy plants may be reduced sufficiently to again occupy the same size of pot with fresh soil.

Stopping and training must be attended to in the early stages of growth, or the



Fig. 8.—A well-trained Azalea—President O. de Kerchove

plants soon get naked and bare at the base. Stop the points of small plants, and when they have broken and pushed several shoots some length, train the strongest down so as to bring them to the rim of the pot; but until they get up to something like a half-specimen size (fig. 9), do not attempt to keep them too close or bushy by over-stopping, or their progress will be unduly retarded. As they get large, train them into the shape desired, keeping the strongest branches near the base. Use no more sticks than are necessary to support the plants, and do not make them too formal. Give plenty of light at all times.

The Belgian nurserymen make a speciality of the Azalea, hundreds of thousands being grown and distributed by them annually. Their plants are generally mop-shaped, the stem, from 9 inches to a foot long, being the stock, and supporting a head of crowded shoots. These plants can be bought for much less than it would cost to grow them in this country. They may be grown on and trained into any desired shape.

Temperature.—Although Azaleas when at rest will bear slight frost without injury, it is not desirable to subject them to a lower temperature than 35° ; and in the case of small stock 45° in winter is low enough. During growth, and until the flower-buds

are set, a temperature of from 55° to 65° at night, with a rise of 10° by day, is good for them, syringing them every afternoon so as to thoroughly wet the leaves, and closing the house with the sun upon the glass. In the earlier part of the growing season they do not require so much air, but some must be given every day to impart strength to the wood and leaves. In the early stages of growth they will also want slightly shading in sunny weather; but this must not be overdone, or it will make the leaves thin and weak. As growth approaches completion and the buds are formed, give more air, reduce the moisture in the atmosphere, and dispense with shading. For plants that have flowered late it will be necessary to use fire-heat later, as also in the northern parts of the kingdom during sunless weather in the summer. In favourable localities they may be turned out-of-doors with decided advantage after the growth has become hardened. A warm sunny spot should be chosen, so as to thoroughly ripen the wood.

Watering.—From early spring, when the plants begin to push out young growth, and throughout the growing season, they must be well supplied with water at the roots, giving less during their time of rest.

Insects.—Azaleas are liable to suffer from



Fig. 9.—Azalea (*Vervaeana alba*)

the attacks of thrips and red spider. If these pests get possession they do great harm, injuring the leaves, causing their premature falling off, and affecting the colour and size of the flowers. Two or three fumigations on consecutive evenings will stop the thrips; whilst by a free use of the syringe both these and the red spider may be kept under.

Selection of Best Varieties

- A. Borsig*.—White, fine form, semi-double.
Alba (indica alba).—For cutting, still one of the best.
Amæna.—Purplish-crimson, hardy, and a good forcer.
Amæna, var. *rosea*.—Bright rose.
Apollo.—Semi-double, brick-red; early.
Apollon.—Single, white.
Baron N. de Rothschild.—Rich purple, free, double.
Bridesmaid.—Pale rose pink.
Brilliant.—Orange-scarlet; a late bloomer.
Bruggense.—Intense crimson-scarlet, double; a fine variety.
Calyciflora.—Salmon-red hose-in-nose small flowers.
Cedo Nulli.—Crimson, one of the darkest.
Charles Leirens.—Dark salmon, semi-double; good forcer.
Daydream.—Pink.
Deutsche Perle.—The finest double, white; good forcer.
Deutsche Kaiserin.—Pure white, double-fringed flowers.
Dr. Moore.—Double, rose.
Duc de Nassau.—Large, dark purple; a profuse grower.
Empress of India.—Rosy-salmon, edged white, semi-double.
Empereur du Brésil.—Large double, rose, bordered white.
Firefly.—Single, dazzling scarlet.
Flag of Truce.—Pure white, double.
Flambeau.—Single, very bright red; late.
Frau Heinrich Seidel.—Very fine single, white.
Hexe.—Bright crimson, single.
Julius Rochos.—Bright crimson-red, double; late.
J. T. D. Llewellyn.—Double, flesh colour; late.
Madame L. van Houtte.—White, flaked rose and scarlet.
Madame Van der Cruyssen.—Double, magenta; early.
Madame Jos. Vervaene.—Brilliant rose, bordered white; early.
Madame Romain de Smet.—Double, rose and white; very early.
Mephistopheles.—Deep rich red, large, with undulated petals.
Mars.—Orange-red, spotted crimson.
Mrs. Turner.—Bright rose, margined white; good forcer.
A. Niobe.—Double, white; late.
Nivalis.—Large snowy-white double flowers.
Obtusa.—Flowers orange-scarlet; very early.
Obtusa alba.—A white form.
Othello.—Double, dark red.
President O. de Kerchove (fig. 8).—Semi-double, rose and white.

- Prof. Walters*.—Single, red and white; early.
Roi de Hollande.—Deep crimson, spotted black.
Roi des Belges.—Scarlet, feathered with carmine, large.
Sigismond Rucker.—Bright salmon, with white edge.
Simon Mardner.—Double, dark rose; very early.
Souvenir du Prince Albert.—Double, rose and white.
Triomphe de Bruges.—Large, fine double, clear pale-rose.
Vervæneana.—Double, white, flaked rose-red; very early.
Vervæneana alba (fig. 9).—Double, white; very early.
William Watson.—Double, red, well shaped.

Begonia (Tuberous Section).—The most valuable addition to garden plants made in the last twenty-five years is undoubtedly the Tuberous Begonia. It had its origin in three or four species introduced from the Andes of Peru and Bolivia by Messrs. Veitch & Sons, viz. *B. boliviensis* (1864), *B. Pearcei* (1865), *B. Veitchii* (1867), and *B. Davisii* (1876). These have large flowers, brightly-coloured, and have quite sufficient attractiveness to secure a place among favourite garden plants; but their claims have been eclipsed by the splendour of their progeny, and they are seldom seen in gardens now. "The series of hybrids distributed by our firm between 1870 and 1880 formed the foundation of the magnificent race we now possess, which, by the energy of the French and other breeders, have reached a development quite unlooked-for at first" (Veitch). The principal breeders of these plants have been Messrs. Veitch, Laing, Henderson, Cannell, Ware, Blackmore & Langdon, and Lemoine.

The seedlings vary considerably in height, size of leaf, sturdiness of flower-stalk, as well as in the size, form, and colours of the flowers. The largest single flowers are 6 or 8 inches across and almost orbicular in outline, whilst among doubles there are flowers which resemble Camellias, Gardenias, Carnations, and Hollyhocks (fig. 10). They vary in colour from the purest white to pink, scarlet, and crimson, and there are numerous shades of yellow. It is difficult to imagine that much more can be done to change the flowers in size, form, or colour, but there is room for improvement in the length and sturdiness of the flower-stalk. The varieties generally come true from seeds, which are readily produced, and their cross-fertilization is simplified by the male and female organs being in different flowers.

Propagation.—The two methods practised for Begonias are those of cuttings and seeds. Cuttings are employed only when it

is desired to multiply any special variety. They are formed of young shoots taken from near the base of the plant, and they should be planted as early as possible so that they can form good tubers early. If too many shoots start from a tuber when it begins to grow in spring, a portion may be cut off close to the tuber and used as cuttings. They root freely if planted in sandy soil against the side of a thumb-pot and placed in a warm propagating frame.

Seeds should be sown in boxes or pans of light sandy soil in January or February, if



Fig. 10.—Tuberous Begonia—Peace

intended to produce nice flowering-plants by the summer. They vegetate freely in a temperature of about 70°. As soon as the seedlings can be handled, prick them out into boxes or pans half an inch or so apart, to be pricked out again when the plants get crowded; after a time pot them off singly, and shift into larger pots as the plants increase in growth. If intended for the open garden, they should be hardened off by about the middle of May to be planted out in the first week of June. One-year-old tubers form splendid plants. The tubers should be allowed to rest from the end of October until the first week in March, when they may be potted up again. They rest best when shaken free of soil and

placed in boxes of dry coco-nut fibre on a shelf in a dry house or shed, or they may be kept dry under a greenhouse stage.

To obtain a succession of bloom, some of the tubers may be potted up fortnightly from the first of February, and started in heat. The last batch of tubers started in May may be placed at once in a greenhouse, where they often make finer plants than those forced earlier. The young plants must be placed as near the roof-glass as possible.

A good compost for Begonias is fibrous loam two parts, leaf-mould one part, and a small quantity of well-rotted stable manure and sand. The compost should be moist. Small tubers may be planted in 2-in. pots, the larger in 4-in., to be repotted again when the pots are well filled with roots. It is better not to water them for a few days after repotting. Drain the pots well for the last shift, placing some moss or fibre over the drainage. Newly-potted plants require careful watering until the roots have taken hold of the new soil. From June onwards plants grown in the greenhouse should be aired freely, avoiding strong draughts night and day. When the pots are well filled with roots, cow-manure water will help the flowers to brightness in colour and large size. A small quantity of soot may be added by tying it up in a bag and stirring it in the water. Artificial manures, if used at all, must be used very sparingly. Some of the plants require to be staked, but those of sturdy habit do not need support. Varieties with weak stems do better in baskets, allowing the stems to hang down. For use in the flower-garden, varieties with decided colours and sturdy habit should be selected. A sheltered position is best for them. Of course it will not do to plant the dry tubers at once in the open ground. They must be started in a heated pit or hot-bed not later than the first week in April, but the heat must not be excessive or it will injure the tubers.

Begonia (Miscellaneous).—Under this heading we include those Begonias which are shrubby or evergreen, and which usually flower most profusely in winter and spring, although with a little management they may be had in flower at almost any time. The majority are true species, but there are also now numerous hybrids which are improvements upon the species, and there is a prospect of a race of Begonias of this section which will fill as large a place among winter-flowering stove and greenhouse plants

as the tuberous section does among those of summer. Their cultivation is as easy as that of Coleus or Fuchsia, the only difference being in the temperature they require, which should be that of an intermediate house (55°-70°). They are easily propagated from cuttings at any time of the year. Those that do not branch naturally should be made to do so by stopping. They prefer an open soil, moderate watering, and shade from bright sunshine; they object to strong stimulants, weak liquid manure now and then being all they require in the way of extra nourishment. The following is a selection of the best species and hybrids:—

B. albo-picta.—Shrubby, leaves 2 inches, green with white circular spots. Brazil.

B. coccinea (corallina).—Stems Bamboo-like, 6 feet or more; leaves green; flowers numerous on drooping peduncles, blood-red, very durable. Brazil.

B. decora.—Stem short; leaves hairy, coppery-red with yellow bands. Perak.

B. Evansiana.—Tuberous with annual stems; leaves red and green; flowers on slender axillary stalks, rose-coloured. Bulbils numerous in leaf-axils. China, &c.

B. fuchsoides.—Root-stock woody, stems tall; leaves small, red when young; flowers rich scarlet in drooping panicles. Mexico.

B. gogoensis.—Stem tuberous; leaves oval with 4-angled stalks, green with bronzy blotches, red underneath; flowers small, pink. Sumatra.

B. Haageana.—A grand plant, forming a large bush with hairy, brown-green leaves, and long stout peduncles with large persistent rose-coloured flowers. Brazil.

B. heracleifolia.—Stem a short rhizome; leaves large, palmate, with long, fleshy, hairy leaf-stalks; flowers on tall, branched panicles, small, rosy-white. Mexico.

B. imperialis.—Stem short; leaves heart-shaped, hairy, brown with bands of grey-green. Flowers on erect stalks 3 inches long, small; *maculata* has more conspicuous blotches; *smaragdina* has green leaves. Mexico.

B. incarnata (insignis).—Stem 2 to 3 feet; leaves medium, reddish beneath; flowers rose-coloured, numerous, on arching peduncles. There are numerous varieties, such as *acuminata*, *maculosa*, *purpurea*; also red-purple forms named Arthur Mallet, M. Hardy, The Queen, &c. This species has been crossed with *B. Rex*. Mexico.

B. Lynchiana.—Not unlike *B. nitida*; stem 3 feet; leaves bright-green, ovate, 6 inches long; flowers large, bright-red, in large panicles 6 inches across. It has been crossed with *B. semperflorens*. Colombia.

B. maculata.—Stem 3 feet; leaves 6 inches long, green above and spotted with glistening white, crimson beneath; flowers in crowded clusters, white. Brazil.

B. manicata (fig. 11).—Stem thick, creeping; leaves large, with long stalks clothed with red scale-like hairs; flower-stalks 1 foot long, bearing a large loose panicle of pink flowers; var. *aureo-maculata* has leaves blotched with yellow. Mexico.

B. metallica.—Stem 4 to 6 feet, freely branched; leaves 3 to 6 inches long, hairy, green, with a

metallic shade; flowers bluish-white. Mexico.

B. natalensis.—Root-stock tuberous; stems annual, 1 foot high; leaves small, green or mottled; flowers numerous, white, on slender erect peduncles. South Africa.

B. nitida.—A useful old garden plant 2 to 3 feet high, with smooth stems and leaves, the latter glossy-green; flowers large, numerous, on long peduncles, pink. Jamaica.

B. peltata.—Stem 1 foot or more; leaves fleshy, ovate, 6 inches or more long, clothed with a silvery tomentum; flowers small, white, on long erect peduncles. Mexico.



Fig. 11.—*Begonia manicata*

B. Rex.—Stem tuberous, fleshy; leaves with long stalks, blade 1 foot across, dark metallic-green with a zone of silvery-grey. There are many varieties, all of the easiest culture and most useful in indoor gardening, either for stove or greenhouse. Himalaya.

B. sanguinea.—Stem 3 feet, branched; leaves dark glossy-green above, crimson beneath; flowers small, white, on long branched peduncles. Brazil.

B. semperflorens.—A variable plant, probably an annual when wild. Stems tufted, 6 to 18 inches high; leaves ovate, glossy-green tinged with red; flowers numerous, white or rose-coloured. It has been crossed with several species. There are numerous varieties, which are dealt with in the chapter on bedding plants. Brazil.

B. socotrana.—Root-stock formed of closely-packed fleshy buds; leaves peltate, orbicular, green, 6 to 9 inches across; flowers on slender

erect stalks, bright-rose, very persistent. This has proved a most useful breeder since its introduction in 1880. There are numerous hybrids between it and other species, all of them good garden plants, which are dealt with elsewhere. Socotra.

B. Sutherlandii.—Like *natalensis*, but the stems and leaves are tinged with red, and the flowers are coloured salmon-red. South Africa.

B. socotrana has also been hybridized with the summer-flowering tuberous-rooted section, the result being a new race of winter-flowering Begonias, with such names



Fig. 12.—Tuberous Winter-flowering Begonia—Optima

as John Heal, Adonis, Winter Gem, Winter Perfection, Ensign, Ideala, Mrs. Heal, Winter Cheer, Julius, and Elatior. Beautiful as these are, they are surpassed by a later set, all single-flowered, and in some cases approaching the well-known tuberous Begonias. They are known as Exquisite, Emita, Fascination, Optima (fig. 12), and Rosalind.

Yet another race, characterized by robust dark-green foliage and double rose, pink, or scarlet flowers, has been raised from *B. socotrana*, the best being Beauty of Hale, Lucy Clibran, Lady Cooper, Apricot, Progress, Clibran's Pink, Success, Altrincham Pink, Duchess of Westminster, and Sunrise. One defect these double-flowered varieties have is that in the neighbourhood of London fogs cause the flowers to drop off.

In propagating these Begonias plenty of stock should be kept, as the plants give very few cuttings. They should be grown in an intermediate temperature and receive very

careful watering, gradually withholding it as they lose their foliage, but at no time must they be allowed to get quite dry, as they have very little reserve; syringing over the pots now and then, rather than watering, will bring them successfully through the resting stage. When cuttings are required, the plants may be started into growth by placing them in a temperature of 55° to 60° and watering and syringing them. The cuttings, if put in between May and July, root readily in a warm propagating case. Gloire de Sceaux, President Carnot, and Lüzerna may be grown either in large pots or planted out, when they make strong shoots which flower freely.

The most valuable hybrid Begonia is Gloire de Lorraine (fig. 13), raised by M. Lemoine from *B. Dreggei* and *B. socotrana*. Its slender graceful habit and wealth of flower make it invaluable as a decorative plant in winter. There are several varieties of it, namely: Amabilis, Turnford Hall, Concurrent, Glory of Cincinnati, and Mrs. Petersen, all excellent winter-flowering plants.

Bouvardia.—Several species of this genus, all Mexican, have been utilized in the production of a garden race of pretty little shrubs, which may be had in flower nearly the whole year round with a little management. It is a mistake to treat them as stove or even warm-house plants; the treatment recommended for the Fuchsia or winter-flowering Pelargoniums being more suitable for them. In the warmer parts of England they may be effectively used for summer bedding, and when the approach of winter threatens them, they may be lifted carefully and planted in pots to flower in early winter in the greenhouse.

Some beautiful double-flowered varieties have been raised by the American florists, to whom also we owe the rich red-flowered seedling known as President Cleveland.

Propagation.—Cuttings of young shoots taken from old plants started in a warm house in February will root in a few weeks if planted in pots of sandy soil and covered with a bell-glass in a propagating house. They can also be readily increased by means of root cuttings, which, some growers say, make better plants than shoots do. In this connection it is interesting to note that the variety Bridesmaid does not come true from root cuttings, a proportion of the resulting plants being the variety Hogarth. When rooted, they should be planted singly

in 3-inch pots in good fibrous loam to which has been added one-fourth leaf-mould and a sprinkling of sand, and kept in a night temperature of 60°, with a rise of 10° in the day; when the sun is powerful, shade a little, syringe them overhead in the afternoon, and close the house with sun-heat. The shoots should be stopped to induce the formation of numerous branches at an early stage. Some growers prefer to keep the plants growing steadily in 3-inch pots until the following February, when

Bouvardias require plenty of sunlight and free ventilation, and although they do not like heavy watering, whilst growing they should not be allowed to get dry. To rest them after flowering they should be placed in an airy house and kept dry for a few weeks, when they may be cut down, started in a moist warm house, and when new shoots are well advanced the plants should be shaken out and repotted. These old plants will serve admirably for a border or bed out-of-doors, planting them out in June.



Fig. 13.—*Begonia*—*Gloire de Lorraine*

they are shifted into 5-inch pots; others shift into these pots in July, and as soon as the plants will bear it they are placed in frames in a sunny situation, giving them plenty of air in the day, and leaving a little on at night. During the summer they may be grown with the *Chrysanthemums*, *Fuchsias*, &c. If the pots are well filled with roots, a little stimulant should be given. They may remain outside until the end of September, when they must be removed to a frame or pit where a little heat can be turned on when the weather becomes cold. If flowers are required through the autumn, a portion of the plants should be at once placed in a higher temperature.

Bouvardias are sometimes attacked by aphids and thrips, which can be kept down by frequent tobacco fumigation. They are also subject to what is known as the *Begonia* mite, a terrible pest, for the eradication of which Campbell's Sulphur Vaporizer should be used. See also article on INSECT AND OTHER PLANT ENEMIES in Vol. III.

Selection of varieties:—

Single

- Candidissima*.—White.
- Dazzler*.—Scarlet.
- Hogarth*.—Scarlet.
- Humboldtii corymbiflora*.—White.
- Intermedia*.—Pink.
- Jasminiflora*.—White.

King of Scarlets.—Scarlet-crimson.
Mrs. Green.—Salmon.
Pink Perfection (fig. 14).
President Cleveland.—Crimson.
Priory Beauty.—Delicate rose.
Rosea oculata.—Delicate pink.
Scarlet Prince.—Bright scarlet.
The Bride.—Blush-white.
Vreelandii.—White.
Vulcan.—Scarlet.

Double

Alfred Neuner.—White.
Bridesmaid.—Pink.
Hogarth, fl. pl..—Scarlet-carmine.
President Garfield.—Pink.
Sang Lorraine.—Vermilion-scarlet.
Triomphe de Nancy.—Orange-red.



Fig. 14.—Bouvardia—Pink Perfection

Caladium.—The several species indigenous to tropical America are the parents of numerous garden hybrids. Their cordate or sagittate leaves are strikingly marbled, blotched, or veined with red, pink, and white, in many cases the deeper or more lively colours largely preponderating. Form and colour alike give them a most distinct character, and they are eminently fitted for associating with ferns and other plants of elegant habit. They are easily grown, one of the principal things to be observed in their cultivation being not to rest the tubers

during the winter in too low a temperature. They are swamp-loving plants in a wild state, and although they may be kept through the winter in a state of absolute dryness, they are safest when left in the soil in which they grew and placed under the stage in a moist warm house.

They are increased by means of the young growths that are thrown up plentifully from the crown of the tubers in February, when they require to be shaken out of the old soil and potted in a light soil into small pots, plunging them in a tan or fibre bed kept at a temperature of about 80°. Some growers prefer to cut up the tuber into as many pieces as it has buds; this is done, however, only when a number of separate plants are required. As they push into growth allow them plenty of light by placing them well up to the glass. They should be shaded during bright sunny weather only. Syringe them overhead every afternoon, and as soon as the pots are filled with roots move them into larger ones. The treatment as regards root-room, soil, moisture, and heat should be liberal, the hottest stove, a rich peaty or light loamy soil with plenty of sand and copious supplies of water being essential to their quick growth, and good specimens cannot be grown unless they are forced up in about three months from the time of starting. Pinch out all flower-buds as they appear. As the autumn approaches they will show signs of going to rest by ceasing to make fresh leaves, and those they already possess will become yellow. They should then be moved to a drier house and allowed to get fairly dry until all the leaves are dead, when the pots can be placed under a stage as already recommended.

If small or moderate-sized plants are required, they may be grown in 6-inch pots, and propagated every spring so as to have a succession of tubers for the purpose. If the intention is to grow them into large specimens, several tubers may be planted in one large pot or pan.

From the acrid nature of their juices these plants are not palatable to many insects; aphids will sometimes attack the young growths, but they can be destroyed by fumigation; red spider will also occasionally make its appearance during the summer if the atmosphere is kept too dry, but it is easily destroyed by a timely use of the syringe.

There are many named sorts. The following is a selection:—

Admiral Togo.
Argyrites.
Barbalhao.
B. S. Williams.
Caravage.
Duchess of Fife.
Excellent.
Golden Queen.
Isis.
John Peed.
Madame Jules Picot.
May Archer.

Marquis of Camden.
Mons. A. Hardy.
Miss Elsie Hoffmann.
Putamayo.
Pantia Ralli.
Rising Sun.
Silver Cloud.
Silver Queen.
Sir Henry Irving.
The Mikado.
Triomphe de Comte.
W. Rappard.

submerging the pot in water, and not by watering, however fine the rose used. The seedlings should be all through in about a week or ten days, and then the glass must be removed from the pot to give air, and the plants pricked out as soon as the second leaf appears. Mistakes have often been made at this point by leaving the plants too long in the seed-pot, treatment from which they never really recover. Similar soil is required, and the plants should be pricked out about 2 inches apart. It is important that the small and weaker seed-

Calceolaria.—The herbaceous Calceolaria, like its companions the Cineraria and

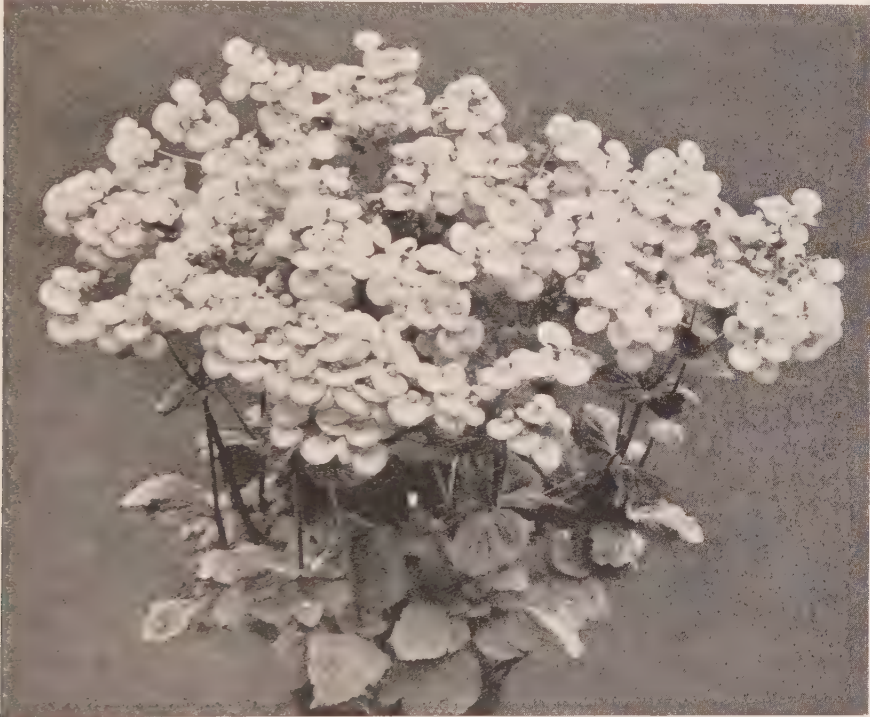


Fig. 15.—Herbaceous Calceolaria

Cyclamen, has undergone an immense improvement in the last quarter-century. It is supposed to have originated in a hybrid between *C. corymbosa* and *C. crenatiflora*, both Chilean species; and subsequent improvement has been largely due to the constant crossing of the best types and the selection of the most promising progeny. The seed, which is exceedingly small, should be sown in June in pots of fine sandy soil. A sheet of glass placed over the pot keeps the soil moist and hastens the germination, but the glass should be turned each day. The soil should be rich and firm, but of a porous nature, and be kept damp by partially

lings should be pricked out as well as the strong ones. The utmost care is necessary in shading, as young leaves are soon burnt if once exposed to direct sunshine in a dry atmosphere. Towards the end of July or early August the plants should have four or five leaves, and be ready to be placed separately in thumb-pots. Good drainage at the bottom of the pot is most essential, and a rich porous soil with a slight mixture of silver sand is the best. The plants should be placed in a frame and have as much air as possible when the weather outside is suitable, and be kept moist and in a growing state, as the least check lays them open to

an attack of green-fly, to which the *Calceolaria* is so liable. Before the end of September they should be moved into larger pots, and kept under glass with moderate heat; the temperature should not be allowed to rise much over 40° or 45°. They should be again shifted into larger pots in which they are to flower in December or January. This must be done before any signs of buds appear. A good compost for the *Calceolaria* is 1 bushel good coarse yellow loam, $\frac{1}{2}$ bushel leaf-soil, 1 gallon silver sand, $\frac{1}{4}$ pint Sutton's Air Garden Manure,



Fig. 16.—*Camellia Sasanqua*

$\frac{1}{4}$ pint soot—well mixed a few days before use. The plants should still be kept in a moist cool atmosphere until flowering is well advanced, when they should be placed in a green-house.

Though there is great variety of form and colour in this *Calceolaria*, the pure-yellow (Cloth of Gold) is the only one that reproduces itself true from seed. All the other varieties can be obtained from a packet of mixed seed if procured from those growers who make a speciality of the *Calceolaria*, and whose exhibits are usually a feature at the June Exhibition of the Royal Horticultural Society. Other good *Calceolarias* of hybrid origin are:

C. kewensis are obtained by crossing Jeffery's Hybrid with the large-flowered forms.

It has an erect branching habit, the flowers being yellow and brown. The different colours come true from seed.

C. cana, a small South American species, with purple, violet-scented flowers, when crossed with the large garden varieties and several species, gave rise to an interesting race of hybrids with a great range of colours. Some have the hoary foliage and violet-scented flowers of *C. cana*; a few of them are sterile, and must therefore be propagated by cuttings, the others produce good seed.

Camellia.—This genus comprises about a dozen species of evergreen trees or shrubs. They are nearly all natives of China and Japan, these two countries being the source of the popular garden *Camellia* (*C. japonica*) in its many forms, the first of which was introduced into England over 170 years ago. There is no record of its having ever been crossed with any other species, so that probably all the forms in gardens are the result of cultivation and selection from *C. japonica*, not only in Europe, but also by the Chinese and Japanese. According to Curtis, in a paper on *Camellias* printed in 1819, there were twenty-nine varieties in cultivation in England at that time, all of them introduced from Japan. Since then many varieties have been raised in France, Belgium, and Italy. The *Camellia* rarely seeds in England, although it sometimes produces its Apple-like fruits freely in the open air in Cornwall.

Other species worth growing in the green-house are *C. reticulata*, with large rose-red Pæony-like flowers; *C. Sasanqua* (fig. 16), like *C. japonica*, but smaller in leaf and flower; and *C. rosæflora*, a small-leaved shrub, with semi-double pink or white flowers. *Camellias* are sufficiently hardy to withstand our winters out-of-doors in the warmer parts of this country, but as they bloom in the spring, the flowers are apt to be injured by cold and wet. Generally they are most satisfactory under greenhouse treatment. A select collection will furnish a supply of flowers for four or five months.

Cultivation.—*Camellias* are best grown in a green-house and protected from frost, where they make their growth under the influence of sun-heat alone as the summer advances. From 60° to 70° in the daytime will be sufficient whilst they are in growth, allowing the temperature to fall again during the night. When the wood is matured and the buds formed, the temperature should be lowered and more air given. Whenever fire-heat is applied to accelerate the opening

of the flowers it should not exceed 55°, sprinkling the stages and floor with water now and then to keep the atmosphere slightly humid. Large specimens should be grown in a span-roofed house, shading them during very bright weather. The practice of placing Camellias in the open air in summer is not always advisable; but if the position is not exposed, and the plants have partial shade, no harm is done. They should not be allowed to remain outside after October.

Camellias frequently spoil for want of pruning. Strong shoots will often spring from the centre, and if not shortened back in time, are certain to weaken the already weaker side shoots. Where the plants have been allowed to grow out of shape, or have been too much crowded, so as to cause them to get naked at the bottom, they may be improved by heading them down. This should take place two months before they commence new growth, providing a temperature of 60°, and keeping the soil fairly dry until they have broken.

Camellias may be planted in either peat or loam, or a mixture of both. In peat they make free growth, and the foliage is always of a rich green; but the disposition to flower is not so free, especially with young plants, unless the supply of water is restricted at the time when the flower-buds should set. A mixture of peat and loam is used by some growers; others prefer loam alone, containing plenty of fibre, and broken in pieces about the size of walnuts, or larger for large specimens, enough clean sharp sand being added to keep the whole porous. The quantity of water they require in the growing season makes it necessary that the soil should be open. Where the flowers are required in October, it is necessary to start the plants into growth early. When about to set their flowers, the shoots thicken at the points, the terminal leaves having attained their full size. This is the time to pot such as require more root-room. The operation must not be delayed until the buds are fully formed, or they will drop off prematurely. If Camellias are potted after flowering, the disturbance of the roots always interferes with the season's growth. They do not require repotting often, as they will grow to a large size with comparatively little root-room. Newly-imported continental-grown plants should be potted into firmer soil as soon as received.

As they complete their growth, and the terminal buds become visible, they should

be kept as dry as is safe without causing the leaves to flag. After the flower-buds have set, the soil should be kept moderately moist, or the buds will fall off. Liquid manure, if applied with judgment during the time of growth, is of great assistance to plants that are wanting in strength, or too much restricted at the root, or that have flowered very heavily. It may be made from sheep or horse droppings or guano, adding a little soot, which keeps worms in check and imparts a dark-green colour to the leaves.

Cuttings of free-growing sorts will strike at any time of the year, but preferably when the wood is nearly ripe, towards the close of the growing season; they may consist of the entire shoot, 4 or 5 inches long, or shortened to one or two joints, and should be inserted in pots of sandy peat plunged in bottom-heat; they will root in five or six weeks. Cuttings made of the ripe wood require to be placed in a cold frame or pit until they have callused, when they may be removed to a heated pit.

Camellias may be grafted at any time of the year, but the best time is the early spring before growth has commenced. Good-sized specimens of inferior kinds, with stems an inch or more in diameter, may be headed down and cleft-grafted, putting two or four grafts on each. These, under good cultural condition, soon make very fine heads.

Insects.—Camellias are subject to attacks of both brown and white scale, which if allowed to go unchecked soon increase to a serious extent. They are easily removed with an ordinary tooth-brush after a thorough syringing with water at 95° to 100°, applied as soon as growth is completed, and again before the buds begin to swell. A strong solution of carbolic soap is also effectual, but it should be afterwards washed off with a syringe or hose. The plants are much benefited by having their leaves sponged over once or twice a year to remove all accumulations of dirt.

Select List of Varieties

Adrien Lebrun.—Large red, beautifully imbricated.

Alba-plena.—One of the best whites.

Archduchesse Marie.—Cerise, striped with white.

Bealii.—Crimson; one of the best; a free late bloomer.

Chandleri elegans.—Light rose; flower large.

C. M. Hovey.—Scarlet, very large; one of the best.

Comte de Paris.—Salmon-pink edged with white.

Contessa Lavinia Maggi.—The best white striped variety.

Donckelaari.—Crimson, marbled-white; semi-double.

Fimbriata.—White, imbricated and fringed.

Grandiflora alba.—Large white.

Henri Favre.—Rosy-salmon; one of the best.

Imbricata.—Crimson, imbricated; one of the best.

Kimberley.—Rich crimson, bright-yellow stamens.

Lady Hume's Blush.—White, flushed with rose.

La Reine.—White, splashed with carmine.

Magnoliæflora.—Shell-pink, distinct in form.

Marchioness of Exeter.—Very large; fine rose-colour.

Mathotiana.—Brilliant red; large.

Mathotiana alba.—Pure white, imbricated.

Mathotiana rosea.—Clear rose, large.

Monarch.—Beautiful dark scarlet; semi-double.

Mrs. F. Sander.—White.

Pearl.—White; one of the finest.

Princess Mary.—Red-crimson, with shell-like petals.

Queen Victoria.—Carmine, banded white.

Reticulata flore-pleno.—Bright rosy-lake.

Tricolor imbricata.—White, crimson stripe on each petal.

Verschaffeltii.—Pale rose, striped with white.

White Swan.—White.

Wild Rose.—White, flushed with pink.

Canna (fig. 17).—This genus has had a place in gardens since the introduction of *C. indica* in 1596. Roscoe's *Monograph*, published in 1806, contains twenty-four coloured plates of Cannas. According to Mr. Baker's review of the genus, published in 1894, there are sixteen good species only. They are fine plants, with bold foliage from 4 to 8 feet high, and branched spikes of red or yellow flowers.

It was not until 1840 that they were taken special notice of by florists, whose first efforts were devoted to their improvement as foliage plants for the subtropical garden—the taller species being mostly used. Deep-brown and even crimson-brown leaved kinds were obtained. *C. Ehemannii*, a hybrid with large crimson flowers, first drew attention to the possibility of obtaining Cannas remarkable for their flowers as well as for their fine leaves. From this, crossed with *C. Warscewiczii* and *C. glauca*, both short-

tubed species, the modern garden varieties have sprung. Their progeny have intercrossed readily, and hundreds of fine seedlings have been the result.

M. Crozy of Lyons took the lead in breeding garden Cannas. Victor Hugo and Felix Crousion were amongst the kinds that drew special attention to Cannas in the



Fig. 17.—*Canna Italia*

gardens of the 1868 Paris Exhibition. Madame Crozy, still one of the best, appeared a few years later.

A new and distinct strain with very large flowers and dark-green leaves was raised by Dammann of Naples. They were obtained by crossing some of the best of Crozy's seedlings with *C. flaccida*; but the petals are not firm enough to stand our English outdoor climate. They are, however, first-rate plants for the greenhouse and stove. The best of them are *Italia*, *Austria*, *America*, and *Burbank*.

Cultivation.—Cannas are useful as pot-grown plants under glass—planted in either large or small pots, according to the size of plants desired. They flower freely out-of-doors when treated as Dahlias, the tubers being started in a greenhouse. Seeds from the best varieties are offered by dealers, and these yield a fair percentage of good sorts, which are serviceable for ordinary decoration both outside and under glass. They are easily propagated by division of the fleshy rhizomes in early spring; a bed of coco-nut fibre with bottom-heat being a convenient and suitable material for them to root in. They should be lifted and potted as soon as they have made new growth and roots, planting them in rich, well-prepared ground when danger from spring frost is past. They flower from July until checked by frost, when the roots should be taken up and stored in a dry shed or cellar until the following spring. Another plan is to take them up before the frost checks them, potting them and keeping them in flower with heat throughout the winter. They can also, when grown in pots, be cut down and liberally treated to encourage young growth in a warm light house, where they make good indoor winter-flowering plants.

Some varieties are specially suitable for cultivating in pots to produce large heads of flowers. When the plants have made several inches of growth, strong, single leads should be selected, trimming off the rhizome so as to get them into 4-inch pots, and when these are filled with roots, the plants should be potted into the flowering size. They like a warm moist atmosphere and plenty of water, adding manure when the pots are well filled with roots. To obtain good heads of bloom the plant must be restricted to one strong growth.

The following is a selection of the best varieties :—

Alphonse Bouvier.	Meteor.
Baron de Richter.	Niagara.
Black Prince.	Oiseau de Feu.
Comtesse de Bouchaud.	Oiseau d'Or.
Duke Ernst.	Papa Crozy.
Duke of York.	President Meyer.
Elizabeth Hoss.	Prof. Dr. Balz.
Franz von Vecsey.	Rosa Gigantea.
Frau E. Kracht.	R. Wallace.
Furst Weid.	Stuttgartia.
J. B. Van der Schoot.	The Geikwar of Baroda.
King Humbert.	William Saunders.
Königin Charlotte.	W. Watson.

Carnation and Picotee (*Dianthus Caryophyllus*).—Among the few plants of our native flora that have become popular as

florists' flowers the Carnation holds a foremost place. Compared with its garden progeny the type is small and unattractive. It grows plentifully on the walls of Rochester Castle. Cultivated varieties were known to Gerard in 1598, when they were grown in pots and protected in winter. Thirty years later Parkinson in his *Paradisus* mentioned twenty-nine varieties, including one called *Daintie Lady*, identical with the *Painted Lady* of modern fanciers. In 1824 Thomas Hogg published a classified list of varieties. He was the first to separate the Picotee from the Carnation. According to his descriptions, there was as great a range of variation in the colours of the flowers as there is now. Many of the varieties were of German origin. The late Mr. Martin R. Smith raised many seedlings and produced some new types, and James Douglas, Great Bookham, Surrey, has given special attention to the improvement of border Carnations.

In selecting plants for seeds or for breeding purposes avoid all with a short calyx, which is likely to split. Flowers that are crowded with small petals should be rejected, as they are likely to burst the calyx by expansion. The selected plants should be placed together for convenience of manipulation. The beginning of July is the most favourable time for crossing. The horn-shaped styles of the Carnation are attached to the apex of the ovary, and they rapidly develop as the flowers expand; when in a receptive condition they are slightly curled, and furnished with delicate fine hairs or down. The pollen, which is produced on the petals, is generally in a powdery state about midday. It should be gathered on to a fine camel-hair brush and gently placed on the hairy pistils. It is well to touch the same flowers with pollen two or three days in succession to ensure fertilization. In wet weather the pollen is lumpy and quite unfit for use. As the petals fade pull them out, or they may cause the seed-pod to decay. Seeds ripen in September from flowers fertilized in July. As soon as the seed-pods become brownish and slightly open at the top, they may be gathered and dried. In Britain seeds can seldom be matured out-of-doors; an airy glass house where the plants are fully exposed to all the light they can obtain being most suitable.

Sow the seed in March or April in pans on a hot-bed, where it will germinate in about eight days, and in another fortnight the young plants may be pricked into boxes or frames. In June or July they will be



Fig. 18.—A House of Carnations—Wivelsfield White

ready to plant out about a foot apart where they are to flower the following season. The soil should be deep and rich.

Layering.—This should be done in July and August, whether the plants are grown in pots or in the border. The “grass”, or young growths produced at the base of the plants, form the layers, and the stronger they are the better. Three or four pairs of the lower leaves should be removed. The best layering knife has a two-edged, very thin blade, which is thrust through the joint about the middle and pressed downwards, bringing it out just below the joint. The layers should be pegged down with wood pegs into a compost of loam, leaf-mould, and sand, and kept moderately moist. By the end of September they will have rooted, and may be removed and potted or planted out. Those planted in pots should be placed near the glass in a cold frame, keeping the lights rather close for a few days, after which more air may be admitted, and in ten days or so the lights may be pulled off altogether on fine days, replacing them at night, but tilting them at the back of the frame. The choicer

varieties should be grown in pots and placed under glass or an awning of tiffany to bloom, the best flowers being thus obtained.

Propagation by slips or “pipings” is slow and troublesome, and is seldom resorted to except for scarce varieties, or when the slips cannot conveniently be layered. They may be put in during summer or early autumn, placing them under bell- or hand-glasses. Or gentle bottom-heat may be used, keeping them rather close until roots have been formed. It is necessary to remove the glasses daily and wipe them dry.

Soil.—Carnations prefer a deep medium yellow loam, enriched with decayed stable manure and sand. Wire-worms are very injurious; the compost should therefore be looked over to see that it contains none of them, one wire-worm being sufficient to destroy two or three plants. Some growers add old mortar rubbish to the compost, as it keeps the soil open.

General Culture.—Starting with the rooted layers in October, those intended for pot culture should be kept in a frame during the winter. The pots need not be plunged, but stood on a hard bottom. In March or

April they should be repotted into 8-inch pots, placing two plants in each pot. Firm potting is desirable.

They thrive best when kept under the glass lights until the end of April, when they may be staked and removed to their summer quarters, which should be a bed with a hard bottom of coal ashes. In May or June they require to be top-dressed with a mixture of equal portions of loam and decayed manure. When the flower-buds appear, it will be necessary to remove some of them if large flowers are desired, whilst to obtain very large blooms for exhibition

flowers last longer when they are shaded.

Tree or perpetual-flowering Carnations differ from the ordinary type by their tendency to produce lateral shoots on the stems, thus forming a sub-shrubby plant. Occasionally these shrubby varieties occur in collections of seedlings. They are usually propagated in January or February by cuttings, seldom by layering. The cuttings are inserted seven or eight in 3-inch pots, in a compost of equal parts of loam, leaf-mould, and sand, covered with a bell-glass, and placed in a gentle bottom-heat in the forcing-house, kept at a temperature of 55°.



Fig. 19.—Allwood's Pink—Susan

only the terminal bud is left. During hot weather the plants require plenty of water, and if syringed once daily green-fly will be kept in check. This pest is sometimes very troublesome, and has to be destroyed by the use of tobacco powder. As soon as the calyx bursts and the petals begin to unfold, it is better to set the plants under glass. Should the calyx burst, a special rubber band, or wire calyx ring, should be used to keep the petals in position. The

When rooted they are potted singly into thumb-pots, and kept in the forcing-house for a few days. After a time they may be repotted into 3-inch pots and placed in a frame, where they can get abundance of air night and day; as it induces sturdy growth. Their final shift should be into 6-inch pots. These may be grown a second or even a third year, by which time the stem will have become quite woody. The plants should stand during the summer on a hard

bottom of coal ashes. Carnations like a light airy situation at all times, and more especially in the winter, when the flower-buds are opening. The flowers are poor in quality in winter unless the greenhouse is kept at a temperature of 50° to 55°.

Another distinct and decorative type of Carnation is the "Marguerite", a recent introduction, of dwarf bushy habit. The flowers, which are clove-scented, are produced very freely on short stems, and are very varied in colour, some being selfs and

Cymbeline, Exquisite, John Ruskin, Lady Fremantle, Lord Napier, Lucy Glitters, Margaret Lennox, Mary Morrison, Mrs. J. J. Keen, Mrs. Walter Hemus (fig. 20), Othello, Peregrine, Peter Pan, Tennyson, Togo, Village Belle.

White-ground Picotees, Red-edged.—Acme, Brunette, Lena, Mary D. Austiss, Radiant, Thomas William.

Purple-edged Picotees.—Ann Lord, Harry Kenyon, Lavina, Mrs. Herbert, Nymph, Portia.

Rose and Scarlet-edged Picotees.—Carrie Goodfellow, Fortrose, Grace Ward, Madeline, Mrs. Wm. Barron, Venus.

Bizarres, Scarlet.—Admiral Curzon, Robert Houlgrave, Supreme, Vivid.

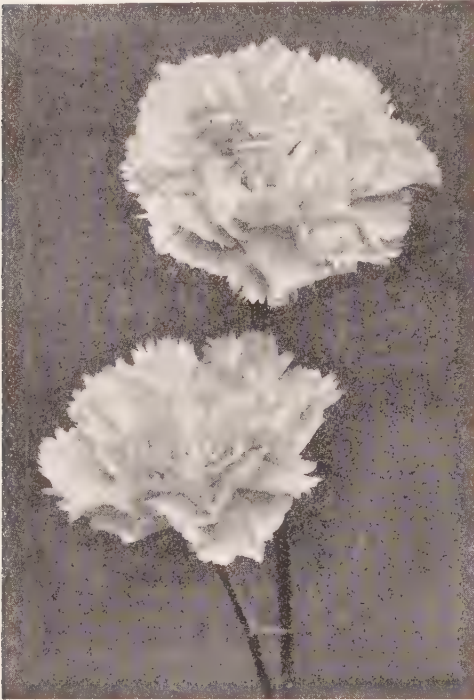


Fig. 20.—Carnation—Mrs. Walter Hemus



Fig. 21.—Perpetual Border Carnations

others striped. Seed sown in February or March soon develop plants which, if put out in good soil, will produce flowers the same season. They are excellent for pot culture.

Select List of Border Carnations

Selfs and Fancies.—Annie Laurie, Bookham Clove, Bookham White, Border Yellow, Cardinal, Centurion, Cupid, Daffodil, Edenside, Elizabeth Shiffner, Fujiyama, Gordon Douglas, Grey Douglas, Grey Friar, Hercules, Induna, Jean Douglas, Lady Hermione, Linkman, Lord Steyne, Miss Willmott, Mrs. Andrew Brotherstone, Mrs. G. A. Reynolds, Mrs. H. L. Hunt, Mrs. P. W. Owen, Purple Emperor, Queen Eleanor, Ronny Buchanan, Rosetta, Salmonea, Surrey Clove, Sweet Anne Page, Trojan, Zulu.

Yellow-ground Picotees.—Agnes, Burgomaster,

Bizarres, Crimson.—Bruce Findlay, J. D. Hex-tall, J. S. Hedderley, Little Dick, Master Fred, Virgil.

Bizarres, Pink and Purple.—Claud Lorraine, Melody, Princess Beatrice, Sarah Payne.

Flakes, Purple.—Earl Stamford, George Melville, Mrs. Douglas, Squire Whitbourn.

Flakes, Scarlet.—Guardsman, Recorder, Sportsman, Torchlight.

Flakes, Rose.—Dolly Varden, Merton, Meteor, Mrs. Rowan, Rose of Stapleford, Rowena.

Tree or Perpetual Carnations, Pink.—Destiny, Empire Day, Enchantress Supreme, May Day, Mary Allwood, Mrs. C. W. Ward, Nora West, Philadelphia, Salmon Enchantress.

Red.—Beacon, Bonfire, Britannia, Champion, St. Nicholas.

Crimson.—Black Chief, Carola, Princess Dagmar, Triumph.

White.—White Enchantress, White House, White Lawson, Wivelsfield White (fig. 18).

Yellow.—Golden Idle, Yellow Prince, Yellow-stone.

Heliotrope and Fancy.—Benora, Bishton Wonder, Circe, Eastern Maid, Geo. Henslow, Marian Wilson, Mrs. John Kyffin, Mrs. T. M. Crook.

Malmaison Carnations.—Albino, Exquisite, Florizel, Lady Audley Neeld, Lady Grimston, Maggie Hodgson, Majestic, Mrs. C. F. Raphael, Nell Gwynne, Prime Minister, Princess of Wales, Terrific.

Chrysanthemum.—The Chrysanthemum is one of the most popular flowers in cultivation, and one of the most useful for all decorative purposes. While it shares popularity with the Rose, it can be grown where the Rose will not flourish, and in many a back-garden in that huge industrial centre which stretches from Aldgate to Stratford, and is enclosed by the River Lea on the north and the Thames on the south, there can be seen in autumn many a home-constructed greenhouse aglow with blossoms of the golden flower. This is also true of provincial cities and towns. The Chrysanthemum is extensively grown for exhibition purposes. There are to be found all over Great Britain societies whose special work it is to promote the culture of the flower for show purposes, and they exist also in our distant colonial possessions. Hundreds find employment in propagating the Chrysanthemum for trade purposes; its culture as a flowering plant for market has grown into a great commercial industry.

The History of the Chrysanthemum.—Records show that the flower was held in high esteem in China and Japan many years before its introduction to Europe. In 1764 a plant of Chrysanthemum was growing in the Botanic Garden at Chelsea, but it attracted little attention and was soon afterwards lost. In 1789 an enterprising French merchant imported some plants from China, but only one survived; in the year following a purple-coloured variety was introduced, and this became the progenitor of the large-flowered section. Within the next fifty years the Chrysanthemum became much grown and greatly improved, and by 1850 there were many varieties in cultivation and Chrysanthemum exhibitions were held. France led the way in raising new varieties from seed, the warmer and drier parts of the south of that country being favourable to seed production. A large number of seedlings were also raised in Guernsey.

In 1846 Mr. Robert Fortune brought from China the Chusan Daisy, the pro-

genitor of the Pompon Chrysanthemum, and in 1862 the Japanese type was sent home by him. The strange fantastic form of the latter soon laid hold upon the popular taste, and its culture was followed by a rapid improvement in form. Many seedlings have been raised in our own country, on the Continent, in our Colonies, and in the United States of America, and there have been occasional introductions from Japan. The Japanese Chrysanthemum is simply a form of the Chinese type modified by



Fig. 22.—Chrysanthemum—Mrs. J. Godfrey

cultivation. The Incurved section, one of the most interesting, is the most difficult to produce in its highest forms. The tendency to sport has manifested itself more or less in all the sections of the Chrysanthemum, many good varieties having been obtained in this way.

Propagation.—Cuttings formed of the new shoots which are thrown up from the root-stock in winter, root readily. It is customary with dealers in Chrysanthemums to make a plantation in the open of leading varieties specially for the production of cuttings, and these are to be preferred to those obtained from highly-fed plants grown to produce exhibition flowers. December, January, and onwards are the busiest times for taking

cuttings; the stock plants being transferred from the open to borders in cold or slightly heated houses, where they continue to yield a supply. Cuttings struck in a temperature of from 45° to 50° in December and January make vigorous plants by February and March. A suitable compost for the cuttings is a mixture of sifted loam, leaf-soil, coconut fibre, and coarse sand in equal parts. The usual length for a cutting is 3 inches. They may be put singly in small pots, or three or four may be placed in a 3-inch



Fig. 23.—Incurved Chrysanthemum—A. Dove

pot, and plunged in a mild heat, or the pots may be placed under a hand-light or small frame, where they can be kept close until rooted. If well watered when planted, they will not require more until rooted. No attempt should be made to force the cuttings into early growth.

In a month they may be potted into 4-inch pots in a soil consisting of three parts fibry loam, one part leaf-soil, and one part rotten manure, sand, and wood ashes, placing them in a house or frame, and keeping them close for two or three days. By the middle of April another shift may be given into 5-inch pots. It is better to under-pot rather than over-pot at this

stage. The compost preferred by one of the most successful growers is three parts fibrous loam, one part leaf-mould, two parts well-decomposed stable manure, a good sprinkling of silver sand, some sifted lime rubbish, with the addition of 1 pound weight of dissolved bones and bone-meal to each bushel of the compost. The soil should be pressed firmly into the pots. If convenient, the plant should stand in a frame for a few days after repotting, and then be placed in the open on a bed of cinder ashes. If this shift has been given in May, and the plants are placed in the open within a week, protection against frost should be at hand. Early in July the final shift should be given, provided that the roots have reached the sides of the present pots. The compost for this shift should be the same as that used for the previous one. It should be prepared quite a month before being used, and be turned two or three times. The pots for the final shift may be 7-inch to 9-inch. Perfect drainage an inch deep is necessary. The soil should be well rammed, and a space of about 2 inches left for water. Too much stress cannot be laid upon the importance of firm potting at this stage. The plants may now be placed in lines in the open, so that sunlight and air may have free access to them. Staking and security against winds and storms should have due attention. These directions are for the cultivation of the Incurved, Japanese, Reflexed, and large Anemone-flowered sections.

Pompons.—The cuttings of these should be taken in January or February. A bushy habit should be aimed at, but if grown for exhibition blooms, disbudding must be practised; terminal rather than crown buds produce the best blooms, and they should be selected from the middle of August to the middle of September, according to the variety and the season.

Early-flowering Chrysanthemums.—These are mainly Japanese varieties, but some are Pompons, and a few it is difficult to classify. They are mainly of dwarf-bushy growth, free of flower, and they require little if any disbudding. For cutting for market and for decorative purposes they are invaluable. Cuttings of these need not be struck until February or March, and as soon as they are strong enough they may be planted out in the open in a sheltered position. It is well to stop the leading shoots two or three times. They are very useful in the flower border, flowering in July and August. They

are also grown in pots for the conservatory in early autumn.

Single Chrysanthemums.—During recent years single Chrysanthemums have gradually increased in favour on account of their decorative value, both for furnishing the conservatory or as cut flowers for indoor use. They can be had in great variety, from small-flowered sorts in light elegant sprays suitable for dinner-table decoration, to quite large-flowered with several rows of ray florets or petals. There is a tendency to breed them over large, thus destroying the elegance of form that is their chief commendation for decoration.

The larger sorts are disbudded more or less according to the particular purpose for which they are required. Many of them are greatly in favour with market growers and florists, as they pack, travel, and stand well.

The small-flowered varieties, of dwarf-bushy habit, are excellent for growing in small pots for the greenhouse or for placing in vases in the dwelling house.

Housing the Plants.—As they need warmth and a dry atmosphere to produce fine blooms and keep down mildew, an early vinery may be utilized for the purpose, although a plant-house which can be wholly devoted to them is to be preferred. By the first week in October, even in the driest parts of the country, the plants should be under protection. The varieties earliest to flower may occupy the coolest and shadiest parts of the house; the later-flowering, the warmest and most airy. After housing, fumigate with Campbell's Sulphur Vaporizer to prevent mildew. If fly should appear, fumigate with "XL All" Vaporizing Compound. Plenty of air should be given night and day. In cold weather a little fire-heat may be advisable to dry the atmosphere and assist the expansion of the blooms. Watering should be done early in the day, and unnecessary wetting of the foliage should be avoided. Stimulants, such as weak guano-water, should be used with caution.

If flowers are required for exhibition, and are likely to be ready too soon, they may be cut with stems a foot long two days before they are fully expanded, and put in water in a dry, dark, and cool place. It is easier to keep a flower a week than to push it on so as to gain a day. A flower is at its best when it has all the centre florets well up, and none of the basal florets have begun to decay.

Such important matters as stopping, tak-

ing the bud, and whether crown or terminal buds are preferable, can be determined by experience. Mr. H. J. Jones has laid down the following general principles: "Respecting the early-flowering section, the varieties should be allowed to break naturally, and many of them being branching in their habit of growth, they continue to develop shoots until the terminal buds appear; in cases where the buds are thickly displayed, a few of these should be rubbed out; but in many cases the foot-stalks continue to



Fig. 24.—Chrysanthemum—Ronald Ferguson

grow, and at length each flower is developed upon a long stem. There are three kinds of buds known to Chrysanthemum growers: the break bud, formed the second or third week in May; the removal of this bud causes the plant to make several shoots, and the grower should select from three to six of these, according to the number of flowers he wishes the plant to produce, removing all the rest. At the tips of these shoots the second bud will be formed, and this is known as the crown bud; as a general rule this bud gives the largest and best flower. When this bud appears, which should be in August, all the shoots round it should be removed, so that the whole force in the shoots may go to the development of the bud it carries. Should the

crown bud appear before August, remove it, and allow only one of the shoots around it to grow. This, as a rule, gives a second crown bud, but sometimes it forms a third kind, termed the terminal bud, and known by having a cluster of small buds round it instead of shoots."

Insect Pests.—Chrysanthemums are subject to the attacks of green and black fly; an effectual remedy is one of the insect powders prepared for the purpose. Frequent syringing in warm dry weather also



Fig. 25.—Reflexed Chrysanthemum—Teresa

helps to keep fly under. The earwig, if not kept down by trapping, is often a source of trouble, injuring the buds and young shoots. A white thrips is occasionally troublesome during dry weather; it may be kept in check by syringing the plants with soot-water. A leaf-mining maggot sometimes attacks Chrysanthemums.

A fungus disease known as rust affects the tissues of the leaves, and, forming spores which ripen and burst, is carried about in the atmosphere. As soon as the presence of the rust is noticed, any plants affected by it should be isolated, the spotted leaves removed and burned, and the plants then be sprayed with sulphide of potassium, a half-ounce of it being dissolved in a gallon of water. This has been found a thorough

cure if the plants be taken in hand as soon as the rust is perceived. (See also article on PLANT DISEASES CAUSED BY FUNGI, Vol. III.)

Seedlings.—It is difficult to secure home-saved seeds, as they do not ripen freely during the winter months. When obtained, they should be sown in March in gentle heat. The seedlings, if well managed, may flower in the November following, but a second season's growth is needed to reveal their true character. New varieties are also obtained by sports, termed by the botanist bud variations. Without any apparent cause a plant will develop a shoot which differs from all the rest, it may be in leaf or flower, in form or colour, or both, and this shoot, if removed and treated as a cutting or a graft, will probably have all its characters fixed and perpetuated. The same variety of Chrysanthemum has been known to sport in several widely separated places simultaneously. Many good varieties have been obtained in this way.

Grafted Chrysanthemums.—The Paris Daisy, *C. frutescens*, has been used as a stock for the Chinese Chrysanthemum. Val d'Andorre, grafted on to this stock, grew in two years nearly 9 feet through, and bore 790 well-formed flowers. The graft was made in January, and the plant was shifted on until, when about twenty months old, it was planted in a tub a yard across. The Paris Daisy is recommended as a strengthening stock for weakly seedlings.

Selection of Fifty Japanese Varieties for Exhibition

- A. F. Tofield.*—Chestnut-red.
- Alec. Harvey.*—Yellow.
- Bessie Godfrey.*—Canary-yellow.
- Bob Pulling.*—Rich yellow.
- Captain Fox.*—Brilliant crimson.
- Dawn of Day.*—Bright orange, shaded red.
- Edith Cavell.*—Chestnut-bronze, gold reverse.
- Francis Jolliffe.*—Creamy-yellow, edged light pink.
- Fred Green.*—Purple.
- General Pétain.*—Red; very large.
- Golden Champion.*—Bronze-yellow.
- H. Sleet.*—Long florets, reddish copper.
- His Majesty.*—Rich deep crimson.
- Hon. Mrs. Lopes.*—Rich yellow; of immense size.
- King George V.*—Rich mulberry-crimson.
- Louisa Prockett.*—Pure white; very fine.
- Loyalty.*—Wine-red.
- Madame R. Oberthur.*—Pure white.
- Master James.*—Glowing chestnut.
- Maud Lousada.*—Rosy-mauve.
- Miss E. Cooper.*—Crimson.
- Mr. F. S. Vallis.*—Soft citron-yellow.
- Mr. Keith Luxford.*—Milk-white.
- Mr. Lloyd-George.*—Crimson-scarlet.
- Mrs. Algernon Davis.*—Rich mauve-pink.

Mrs. B. Carpenter.—Long rose-pink florets.
Mrs. E. A. Tickle.—Soft mauve-pink.
Mrs. G. Drabble.—Marble white; very large.
Mrs. G. Lloyd Wigg.—Yellow, with buff shading.
Mrs. Gordon Baker.—Brick-red, gold reverse.
Mrs. Howard Kinsey.—Beautiful white.
Mrs. James Gibson.—Mauve-pink.
Mrs. M. Sargent.—White, shaded green.
Mrs. R. Luxford.—Indian-red, old gold reverse.
Mrs. Wainwright.—Flesh-pink.
Mrs. W. Holden.—Chestnut-red.
O. H. Broomhead.—Rich deep rose.
Princess Mary.—Yellow; sport from Queen Mary.

Queen Mary.—Very large white.
Rear-Admiral.—Bronze and crimson.
Reginald Vallis.—Purple-amaranth; very large.
Rosamund.—Primrose, flushed old gold.
Rose Day.—Silvery rosy lilac.
Sir E. Letchworth.—Purple silvery reverse.
Sir Wm. H. Dunn.—Terra-cotta.
Valerie Greenham.—Bright pink.
White Queen.—Large white; early.
Wm. Rigby.—Large yellow; a sport from Mrs. G. Drabble.
William Turner.—Pure white.
W. Mease.—Old rose-cerise.

Selection of Twenty-five Decorative Varieties

A. J. Balfour.—Pink.
Bertha Lachaux.—Bright mauve-pink.
Caprice du Printemps.—Bright rose.
December Gold.—Deep yellow.
Estelle.—Bright crimson.
Freda Badford.—Bronze-orange, shaded apricot.
Heston Pink.
Heston White.
Heston Yellow.
Kathleen Thompson.—Crimson-red, tipped gold.
La Triomphante.—Soft pink.
Lizzie Adcock.—Bright golden-yellow.
Market Red.—Beautiful velvety-red.
Moneymaker.—Fine white.
Mrs. Thompson.—Fine late white.
Nivens.—White.
Phæbe.—Pink.
Pink Pearl.—Beautiful pearl-pink.
Princess Victoria.—Creamy-white.
Terra Cotta.—Rosy terra-cotta.
White Caprice.—Creamy-white.
W. H. Lincoln.—Deep golden-yellow.
Yellow Cap.—Bright yellow.
Yellow Moneymaker.
Yellow Mrs. Thompson.

Selection of Twelve Incurved Varieties

A. Dove (fig. 23).—Large, well formed, white.
Buttercup.—Clear buttercup-yellow.
Charles H. Curtis.—Rich deep yellow.
H. W. Thorp.—White; large compact flower.
J. W. Streater.—Primrose.
Lady Isabel.—Clear lavender.
Madame Ferlat.—Pure white; very fine.
Miss Cora Stoop.—Light mauve-pink.
Mrs. G. Glenny.—Primrose.
Mrs. G. Rundle.—Pure white.
T. H. Hambledon.—Large rich rose.
W. Biddle.—Deep lemon, shaded red.

Selection of Six Anemone-flowered

Caledonia.—White, centre lilac, shaded yellow.
Clara Owen.—Pale straw colour.

Godfrey's Perfection.—Pure white; fine sprays.
T. Thorp, Junr.—Bright yellow.
Madame Lawton.—White and rose, yellow centre.
Prince of Anemones.—Lilac.

Selection of Six Reflexed Varieties

Boule de Neige.—Pure white.
Dorothy Oxberry.—Soft pink.
Golden Christine.—Golden-buff.
Julie Lagravere.—Dark crimson.
Pink Christine.—Light pink.
Putney George.—Crimson and gold.

Selection of Six Pompon Varieties

Golden Mlle Marthe.—Golden-yellow.
Mlle Elsie Dordans.—Rose-pink.
Mlle Marthe.—Pure white.
Rubra Perfecta.—Dark crimson.
Snowdrop.—Sprays of tiny white flowers.
W. Westlake.—Pale yellow.

Selection of Six Hairy Varieties

Beauty of Truro.—Yellow, flushed with purple.
Belle des Gordes.—Rosy-red.
Hairy Wonder.—Bright-reddish bronze.
Hairy Beauty.—Pure white.
Louis Bochmer.—Rose-pink.
Mrs. C. B. Freeman.—Golden-yellow.

Selection of Twenty-four Single Varieties

* *Bronze Edith Pagam.*
 * *Buttercup.*—Rich yellow.
Caterham Bronze.—Very fine.
Caterham Yellow.
Darenth Jewel.—Rosy-lilac; fine sprays.
 * *Edith Pagam.*—Pink.
 * *Golden Mensa.*—Yellow; sport from Mensa.
Golden Spray.—Very beautiful long elegant sprays.
Ivan Edwards.—Pink.
Mary Richardson.—Reddish-salmon.
 * *Mensa.*—Pure white.
Miss Mary Pope.—Pink; pretty sprays.
Mrs. Loo Thompson.—Primrose; sport from Mensa.
Mrs. W. Buckingham.—Clear pink.
 * *Mrs. W. Higgs.*—Blush-pink.
Phyllis Cooper.—Golden-yellow.
 * *Pink Beauty.*—Soft lilac-pink.
 * *Portia.*—Red.
Red Star.
 * *Rowena.*—Soft crimson-red.
Sandown Radiance.—Rich chestnut-crimson.
 * *Sussex Yellow.*
Sylvia Slade.—Deep rosy-red, white at base.
White Edith Pagam.

Those marked with an asterisk are large flowering, and should be disbudded.

Selection of Twelve Varieties for the Open Ground

Crimson Marie Masse.
Crimson Polly.
Goacher's Crimson.
Horace Martin.—Golden-yellow.
Madame Marie Masse.—Lilac-mauve.
Nina Blick.—Bright scarlet.
Normandie.—Blush-pink.

O. J. Quintus.—Lilac-pink.
Polly.—Deep orange.
Roi des Blancs.—Pure white; fine sprays.
White Masse.—Sport from Mme Marie Masse.
White O. J. Quintus.

Selection of Six Single Varieties for the Open Ground

Carrie Luxford.—Rich crimson.
Firebrand.—Chestnut-crimson.
Grace.—Pure white.
Kitty Riches.—Pink.
Mrs. Comfort.—Canary-yellow.
Mrs. John Newton.—Bright terra-cotta.

Selection of Six Early Pompons for the Open Ground

Crimson Precocite.
Flora.—Golden-yellow.
Lyon.—Rosy-purple.
Piercy's Seedling.—Old gold; compact and bushy.
St. Crouts.—Light pink.
White St. Crouts.

Cineraria.—The Greenhouse Cineraria (fig. 26) has been evolved by selection and



Fig. 26.—Cinerarias

cross-breeding from *Senecio* (Cineraria) *cruentus*, a native of the Canary Islands. Various hybrids between this species and several others have been raised in gardens, but no trace of any other species than *S. cruentus* can be found in the plants now popularly

known as Cinerarias. Named varieties are sometimes propagated by means of cuttings; generally, however, the plant is treated as an annual, the varieties coming true from seeds. They can be raised in quantities, and are comparatively easy to grow if kept free from aphides, to which they are more than ordinarily subject. These insects nearly always follow some slight check in the growth of the plant, and by far the best way of prevention is to keep the plants in a constant state of growth, giving them plenty of water and encouraging them to grow freely from the first. They like moderate shade, plenty of air, and a moist atmosphere at all times, but air should not be given in a way to come directly through them in a current. They flower in the winter and spring, when their exceedingly bright colours render them suitable conservatory decorative plants, and also for furnishing cut flowers. They do not bear forcing, as it makes them leggy and small in flower; on the other hand, it is well not to grow them too cool.

Seeds should not be sown before the end of April or early in May. A second sowing may be made in June for a later batch. Sow in pans in a compost of three parts good loam, two parts leaf-mould, mixed with one-sixth sand; and sow the seeds thinly, as the seedlings when too much crowded in the seed-pan get their roots injured in potting off. Place the pans in shade, and do not water more than is requisite before the plants are up. After they have vegetated keep the soil moderately moist, and place where the seedlings will get plenty of light but little sun; when large enough to handle, prick them out in pans or pots filled with similar soil to that in which they were sown, adding less sand. When the seedlings have two or three leaves, plant them singly in 4-inch pots, and move into shallow frames facing north or on the shady side of a wall. Give plenty of air, and from their first appearance above-ground never allow them to get dry. For most purposes 6-inch pots are large enough, if the plants are well attended to, and liberally supplied with manure-water as the pots get filled with roots. Pot moderately firm, and all they will require during the remainder of the summer will be to keep them regularly supplied with water, air, and shade, the bed of ashes on which they are stood being in hot weather always kept damp. As the autumn advances they should be removed to a pit where a little heat can be provided. If set on wood shelves, an

inch of sphagnum moss placed under them and kept damp will be beneficial, and if in a house with side-lights, they must not be placed near where these open so as to let the air come directly on them. As soon as they show signs of forming their flower-stems, give manure-water at every alternate watering, but do not allow it to touch the leaves; this will give them strength and much increase the quantity of flower they produce. They will flower about Christmas in a temperature of from 40° to 45° at night, with a little more warmth in the day. A few of the best should be selected for seed. The blues, self-reds, and white grounds tipped with red are the principal colours. Those intended to bear seed should be placed, whilst in flower, away from the others, each colour in a small frame at some distance apart, so that they will not get crossed by bees. The seed should be gathered as soon as ripe.

C. stellata, the Star Cineraria, is the result of crossing garden forms and *S. cruentus*. The flowers are small and starry, and produced in immense numbers; the plants vary in height from 1½ to 4 feet and are very decorative. Several other good crosses between tall-growing species, such as *C. hortense* and *C. multiflora*, and the garden Cineraria have been raised.

Insects.—These can be destroyed by fumigation, but the applications must be slight, or the bottom leaves are certain to suffer. A better method, yet involving a little more labour, is to keep always on hand a supply of tobacco water in a vessel sufficiently large to admit of the plants being dipped.

Clematis.—The true species of Clematis are dealt with in another part of this work. Beautiful as some of them are, they cannot be compared with the purely garden types with which we have now to deal, either in the size and brilliant colouring of the flowers, or in the showiness of the plant as a whole. They have been obtained by intercrossing *C. viticella*, *C. patens*, *C. lanuginosa*, and *C. florida*. A new group has lately been added by Messrs. Jackman of Woking, by crossing *C. coccinea*, a North American species, with the garden varieties.

The first hybrid was raised in 1835, from *C. viticella* and probably *C. integrifolia*. It is interesting now chiefly because it is one of the parents of the important *Jackmani* race. In 1850 Mr. Anderson-Henry of Edinburgh crossed *C. patens* with *C. lanuginosa*, introduced from China by Fortune a few years before. In 1858

Messrs. Jackman & Son, Woking, crossed *C. lanuginosa* with *C. Hendersoni* and a variety of *C. viticella*, and amongst the seedlings thus obtained the famous *C. Jackmani* appeared. Other breeders of Clematis were Messrs. Simon Louis Frères of Metz, C. Noble, Cripps & Son, and R. Smith & Co. of Worcester.

Few hardy climbers provide a more gorgeous display of flowers, spread over so long a time, than the garden Clematis. In the open they may be trained on pergolas, rough poles or trellises, or massed in beds, or be allowed to ramble over old tree-stumps or rock-work. Some sorts are useful in the cool greenhouse, either planted out and trained up the rafters or pillars, or cultivated in pots and trained on wire supports.

The soil in which Clematis thrive best is a rich, not too heavy loam. They like chalk or lime, and if this substance is not present, the ground should be dressed with it occasionally. Clematis are gross feeders, and a good annual mulching of rotted manure is of great benefit to them. At the first planting the ground should be thoroughly trenched, and if it be of a heavy nature, a good proportion of leaf-soil should be mixed with it. If light and sandy, it should be strengthened by adding stiff loam.

Pruning should be done about the end of February, and the aim should be to cut out weakly, unnecessary growths, and to shorten back the others. Many varieties, if left alone, are apt to form a few stems bare at the bottom, and a huge, top-heavy tangle of shoots. The *Jackmani* group may safely be cut back each year to within a few inches of the previous year's wood. *C. lanuginosa*, and hybrids from it, need less pruning. The *C. patens* and *C. florida* groups need little or no pruning, as they flower in spring and are not so vigorous as the others.

Pot Culture.—The cultivation of Clematis in pots has been brought to a high state of perfection. The usual method is to grow them in 14-inch pots, training the shoots over balloon-shaped trellises made of wire or wood. To obtain good specimens three plants may be grown in one pot. The soil must be of a rich loamy nature and well drained. Plenty of water and frequent supplies of manure-water are necessary in the growing season. Any light, airy house where the winter temperature ranges between 40° and 50° will do for them. To secure plants in flower by April or May they must be taken inside during January. By introducing batches at subsequent inter-



Fig. 27.—Pot-grown Clematis—Princess of Wales

vals, a succession of flowering plants is ensured. After flowering, the plants may be placed out of doors to thoroughly ripen the growths, which is an important matter. Owing to their late flowering habit, the *Jackmani* and *Viticella* groups are not suitable for growing in this way. The *lanuginosa*, *patens*, and *florida* groups furnish the most popular varieties.

Clematis are apt to die suddenly, large plants collapsing in a short time without any apparent reason, though some contend that it is due to their being grafted on the roots of *C. vitalba* and of *C. Viticella*. Others maintain that it is due to a fungoid disease, probably *Ascochyta Clematidina*, as the plant is generally attacked some way up the stem and dies downwards. It has, however, been shown that seedling plants, also those raised from cuttings, die back in the same way.

Clematis do not root readily from nodal cuttings, but do so from internodal cuttings, that is, when cut between the nodes.

The following are specially recommended for pot-culture:—

Impératrice Eugénie, *Purpurea elegans*, *Princess of Wales* (fig. 27), *Sensation*, *Madame Van Houtte*, *Fairy Queen*, *Marie Lefebvre*, *Belle of Woking*, *Venus Victrix*, and *Mrs. Geo. Jackman*.

SELECTION OF SORTS FOR GENERAL CULTIVATION

I.—*Patens* Group

Blooms from May to July from the wood made the previous season. The type has bluish-lilac flowers, 5 inches to 6 inches across.

Edouard Desfossé.—Deep mauve.
Fair Rosamond.—Blush-white, red bar on sepals.
Marcel Moser.—French-white, pink bar.
Mrs. Geo. Jackman.—White, with creamy bar.
Sir Garnet Wolseley.—Pale blue, with plum-red bars.
The Queen.—Violet, 6 inches across, scented.

II.—*Florida* Group

These flower on the wood of the previous season, but the flowers of the earliest varieties do not appear till June. The plants are on the whole less vigorous than the others.

Belle of Woking.—Silvery-grey, double.
Countess of Lovelace.—Bright bluish-lilac, anthers yellow.

John Gould Veitch.—Pale blue; from Japan in 1862.

Lucie Lemoine.—White, double, anthers yellow.
Venus Victrix.—Delicate lavender, double.

III.—*Lanuginosa* Group

The most important group. The parent species flowers in summer on young growth. When grown on pillars, &c., a shortening back of some of the shoots may be done, so that the lower part may not be left bare.

Anderson Henry.—Large creamy-white flowers.
Beauty of Worcester (fig. 28).—Rich bluish-violet, 5 inches across.

Fairy Queen.—Flesh-coloured, 7 to 9 inches across.

Impératrice Eugénie.—Pure white.
Lady Caroline Nevill.—French-white, with mauve bars.

La France.—Deep violet-purple.
Lord Nevill.—Dark plum-coloured, sepals crimped.

Purpurea elegans.—Deep violet-purple.



Fig. 28.—Clematis—Beauty of Worcester

IV.—*Jackmani* Group

This group is noteworthy for its vigour and for its long flowering season, namely from July to October. The flowers are borne on the current season's growth, and the plants may consequently be pruned almost back to the old wood if necessary.

Jackmani superba.—Large, dark violet-purple.

Lilacina floribunda.—Pale greyish-lilac.

Madame E. André.—Bright crimson, free-flowering.

Smith's Snow-white Jackmani.—Paper-white.

Star of India.—Reddish plum-coloured, with red bars.

Velutina purpurea.—Blackish-mulberry.

V.—*Viticella* Group

Flowering season and treatment the same as Group IV.

Lady Bovill.—Flowers cupped, greyish-blue.

Madame Grange.—Crimson-violet, reddish in centre.

Mrs. Jas. Bateman.—Pale lavender.

Thomas Moore.—Bright magenta, stamens white.

VI.—*Coccinea* Group

C. coccinea is a species with fleshy pitcher-shaped flowers, swollen at the base, and nearly closed at the top, the tips of the sepals recurved. Being of a scarlet or carmine colour, new shades as well as a new shape of flower have been obtained by Messrs. Jackman by crossing it with garden varieties.

Countess of Onslow.—Violet-purple, with a red band.

Duchess of Albany.—Bright pink and lilac.

Duchess of York.—Blush-pink.

Clivia (fig. 29).—A South African genus of three species of free-flowering evergreen plants belonging to the Amaryllis family. They form sturdy compact masses of thick, strap-shaped leaves resembling those of the *Hippeastrum*, and a fleshy root-stock. Their showy flowers are borne in large umbels on stout scapes well above the leaves, and are various shades of orange-red in colour. *C. miniata* far surpasses the other two in beauty, and from it, by cross-breeding and selection, a valuable race of greenhouse plants has been obtained. They are first-rate plants for the conservatory, house decoration, or for cutting. If placed in a cool room, the cut flowers will last at least a fortnight. To have them at their best an intermediate temperature is necessary, though they are not unhappy under greenhouse culture. They do equally well when grown in pots or borders. They are excellent for large houses, where, if planted in the shade of the taller plants, they will continue to grow and flower well; but if they can be given a sunny position, where they can be rested during winter, so much the better.

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Being quick growers and rank feeders, they must be planted in a rich compost; good loam, mixed with a fair amount of rotten manure and sand, being suitable. Plants grown in pots, and which have been rested during winter, should be repotted in February, kept close, and syringed frequently until root-action has recommenced and flower-spikes appear, when more air and plenty of moisture are necessary. For ordinary purposes single-crowned plants in 6-inch pots are most serviceable, but where large specimens are required, a number of



Fig. 29.—*Clivia miniata*

strong growths may be put together in 10-inch pots. Propagation by division is slow. Seeds are readily ripened; they should be sown in heat, and the young plants pricked off in a bed of good soil in an intermediate house, where they will attain flowering size in about three years.

C. miniata.—The type has flowers 2 inches across and 3 inches long, orange-red, in umbels of from fifteen to thirty each on stout erect scapes 12 to 18 inches long; leaves sturdy, 2 feet long, straighter than in *C. Gardeni*. There are numerous named varieties, differing from each other in the number, size, and shape of the flowers, and intensity of colour. Var. *citrina* is a distinct variety with pale-yellow flowers, and was introduced from Zululand in 1887.

C. Gardeni.—Leaves 2 feet long, deep-green, arching. Flowers pendulous, tubular, 1½ inches long, orange, tinged with red and tipped with green; in large loose heads.

C. nobilis.—A sturdy plant with wider, more

Fig. 30.—*Codiaëum* (broad-leaved)

upright leaves and longer flower-stems than either of the others; but the flowers are smaller, tubular, red and yellow, pendulous, and often fifty together in a loose umbel.

C. cyrtanthiflora is a garden hybrid between *C. miniata* and *C. nobilis*. The flowers are pendulous, in large heads, and intermediate in size and shape between the two parents, as also are the leaves.

Codiaëum (Croton).—The Crotons of gardens are all forms of a single species of *Codiaëum*, long cultivated as a decorative plant in the tropics, and first introduced into this country by Loddiges, who figured a form of it in his *Botanical Cabinet* (t. 870) under the name of *Croton pictum*. It was also figured in the *Botanical Magazine*, t. 3951 (1831), under the name of *Codiaëum pictum*. Its correct botanical name is *Codiaëum variegatum*, and it is a native of the Molucca Islands, although now semi-wild in many parts of the tropics, where many of the cultivated varieties originated. Sir Joseph Hooker describes it as an evergreen shrub with leaves 2 to 10 inches long, very variable, from oblong to narrowly linear, often wavy, and variegated green and yellow, showing an infinite variety of form and colouring. The flowers, which are insignificant, are borne on axillary spikes or racemes, the males and females on separate spikes. They are easily crossed, and

numerous seedlings have been raised in gardens in this country, where they have become indispensable as decorative plants, playing a most important part both in the plant-stove and in floral groups.

Culture.—*Codiaëums* are not difficult to cultivate. Cuttings may be struck at any season of the year in a bottom-heat of 80°. It is best to strike a yearly supply late in the autumn. The growths, if taken then, are not active or sappy, hence far less check is experienced, and they root readily in a close pot or frame. The best cuttings to form single-stemmed plants are those of upright growth rather than side shoots. If, on the other hand, a larger specimen is intended, then take a stout cutting with four, five, or more shoots upon it. This will strike in a close pit just as freely as a single shoot. It is always better to choose well-coloured shoots with healthy foliage to the base of the cutting. When rooted, they should be potted in an open loamy soil and pushed on in heat. Abundance of light is essential to develop the colour in the foliage; it also induces a short-jointed, sturdy growth. Where a sufficient number of these and other light-loving plants are grown, it is a good plan to so arrange them as to avoid the use of sun-blinds, save in a minimum degree. Plants kept somewhat confined at the root are better able to support exposure to a lower temperature or a dry atmosphere, as, for instance, when used for furnishing

Fig. 31.—*Codiaëum* (narrow-leaved)

purposes. Liquid manure may be given. A top-dressing with an artificial compound containing bone-meal may be employed to give strength to pot-bound plants. Plants in full vigour will take a liberal supply of water at the roots, and frequent syringing overhead, which serves to keep down insects.

Insect Pests.—For mealy bug and scale hot water is a good remedy, easy of application, using it at such a temperature as the syringe when filled can be held in the hand with tolerable comfort. A small, rather long kind of scale is frequently found along the margins and midribs of the leaves, clinging most tenaciously, so that it can only be removed with a strong insecticide such as "XL All". Red spider does much damage if the syringe is not freely employed. For bad cases sulphur should be mixed in the water. A mite similar to that which attacks Begonias sometimes gets on Codiaëums, causing the young leaves to drop when quite small. Fumigation with Campbell's Sulphur Vaporizer will keep down this pest. Thrips will cause trouble in a similar way and upon the older foliage too, but the syringe and fumigation will keep them in check.

Selection of Varieties

Broad-leaved.—Andreanum, Queen Victoria, Baron James de Rothschild, Williamsii, Thompsonii, Reidii, Veitchii, Undulatum, Sunset, Sunrise.

Narrow-leaved.—Angustifolium, Aigburth Gem, Chelsoni, Johannis, Picturatum, Flambeau, Golden Ring, Prince of Wales, Elegantissima, Weismannii, Mrs. Dorman, Ruberrimum.

Lobed-leaved.—Disraeli, Earl of Derby, Evansianum, Mortefontanense, Illustris, F. Sander.

Twisted-leaved.—Golden Ring, Caudatum, Tortile, Spirale.

Coleus.—Although popularly supposed to be of hybrid origin, the numerous forms of garden Coleuses are the progeny of *C. Blumei*, a native of Java, where it was long cultivated as a garden plant before its introduction into Belgium about ninety years ago. Forms of it have been named *C. Verschaffeltii*, *C. Gibsoni*, *C. Veitchii*, &c. In 1867 a batch of new seedlings, obtained, it is said, by crossing these three forms, was raised at Chiswick. The plants seed freely, and from these numerous forms are easily raised. There are now many named varieties, amongst them being all the shades of red from pale-pink up to the deepest crimson, and green from the faintest to dark-olive, combined with yellow—these variously blended, from varieties that have half their leaves yellow and the other part crimson,

to those that are spotted and edged in the most regular manner. In the conservatory they are very effective and useful in the summer. They are quick growers, very easy to increase, and are best propagated every year from cuttings taken in March from a plant or so of each kind, preserved through the winter in a warm house with a minimum temperature of 55°. Insert the cuttings in thumb-pots in sandy loam, place them where they will have a night temperature of 60°, and keep them moist and shaded from the sun. In a fortnight or three weeks they will have rooted, when they may be moved into 6-inch pots, using ordinary loamy compost with a moderate quantity of sand. Keep them in a sunny position near the glass, and pinch out the points to induce a bushy habit. They should be well syringed overhead at least once a day, preferably in the afternoon. In the course of a month they may be repotted into larger pots, according to the size to which it is intended to grow the plants. For general purposes 8-inch pots are large enough, but large specimens require 12-inch pots. In June give them more air and less heat for a week or two before removing them to the conservatory or greenhouse, where they will do well until October, when they may be destroyed, retaining only sufficient to afford a supply of cuttings in the succeeding spring. *C. thyrsoideus*, from Uganda, a winter-flowering species, with long erect spikes of bright blue flowers, is now largely cultivated for the conservatory.

These plants are little subject to insects, although red spider will sometimes attack them if the atmosphere in which they are grown is kept too dry.

Crocus.—The Crocus is one of the earliest, hardiest, and brightest in colour of all spring-flowering bulbs, and the Dutch roots are so cheap that they should be planted by the thousand in all good gardens. The genus contains in all seventy or more species distributed over Europe, North Africa, and North and Western Asia. Mr. George Maw's beautiful *Monograph of the Genus Crocus* may be consulted by all interested in the rarer kinds. Our native species, *C. vernus*, is most variable, and is the origin of most of the purplish-coloured Dutch seedlings—the golden varieties being derived from *C. aureus*. These two yield the best of the spring-blooming kinds, the most showy autumnal kind being the blue *C. pulchellus*.

Their cultivation is very simple, as they thrive in nearly all soils, although preferring light loam, or even sand or gravel. The corms or bulbs should not be planted more than 3 inches deep or they are apt to perish. They may be grown in pots if planted in sandy soil or in wood-moss and leaf-mould; they flower very early if sheltered in a sunny frame. Some of the most fragile of the autumnal kinds suffer so much from cold rains and rough gales that they are rarely seen to the best advantage unless sheltered in cold pits or frames. All are easily grown in pots in a sunny window.

Species of *Crocus*

C. aureus.—The harbinger of spring flowers, vivid orange-yellow. May be grown anywhere. South-eastern Europe.

C. biflorus.—Scotch Crocus. Flowers white or pale lilac, very variable. *C. Weldeni* and others are forms of this species. Tuscany to Georgia.

C. chrysanthus.—Yellow-flowered. There are three or four named forms, such as *albidus*, *fusco-tinctus* and *fusco-lineatus*, *cærulescens*, &c. Very free and early. South-eastern Europe.

C. hadriaticus (fig. 32).—Leaves and flowers produced together, the latter white, tinged with yellow at base inside, with brown outside; stigmas orange. October. Albania, &c.



Fig. 32.—*Crocus hadriaticus*

C. Imperati.—Neapolitan Crocus. The earliest to bloom in January out-of-doors. Flowers lilac or purple, fawn-coloured, and striped behind and in bud. There is a white variety, very free and hardy. Naples.

C. iridiflorus.—Iris-flowered, autumnal, three of the segments broader than the others. Colour lilac or purple. Transylvania.

C. medius.—Flowers bright mauve-purple, striped at base of inner segments; stigmas conspicuous, bright-orange. October. Maritime Alps.

C. nudiflorus.—Autumnal Nottingham Crocus, being formerly found in meadows there along with the spring-flowering *C. vernus*. Flowers purple or violet. South-western Europe.



Fig. 33.—*Crocus speciosus*

C. pulchellus.—Flowers bright lilac, large as in *speciosus*, but with a yellow eye and much less conspicuously striped. October. Asia Minor.

C. reticulatus.—An early and pretty spring-flowering species, with flowers varying from white to purple, but always striped with purple on the three outer segments. Anthers orange; stigma scarlet. Caucasus.

C. sativus.—Saffron Crocus. One of the oldest of cultivated plants, mentioned by Solomon. Formerly much grown at Saffron-Walden and elsewhere in England. Flowers violet-purple in autumn. There are many varieties. Italy to Kurdistan.

C. Sieberi.—Perianth lilac-purple, with an orange throat; stigmas vivid orange-scarlet. March. Greece.

C. speciosus (fig. 33).—Best autumnal kind. Flowers blue-purple, with orange stigmas, very free and hardy. Bosphorus.

C. Susianus (Cloth-of-Gold Crocus).—A well-known old garden plant, flowering in February, its buds heavily striped with dark purplish-brown; also called *C. revolutus*, as its three outer segments often reflex with age. Very early, bright, and showy. Crimea, Persia, Caucasus.

C. vernus.—Spring Blue or Purple Crocus, of all colours except yellow. Very hardy and showy. Europe.

C. versicolor.—Parti-coloured Crocus, one of the oldest of garden plants, and most variable, yielding all sorts of lilac, purple, and striped forms from seed. Maritime Alps.

C. zonatus.—Like *pulchellus*, but with a distinctly marked yellow ring near base of cup and with smaller stigmas. September. Asia Minor.

Best Dutch or Garden Sorts

Yellow.—Giant Golden (selected), Common Yellow, Cloth of Gold.

White.—Caroline Chisholm, Grootvorst, Jeanne d'Arc, Josephine, Mont Blanc, Mammoth, Queen Victoria, Snow Queen, La Noblesse, Reine Blanche, Grand Vainqueur, Diamond.

Variegated.—Albion, Comtesse de Marny, Ida Pfeiffer, Amazone, Van Speyk, Lady Stanhope, La Majestueuse, Sir Walter Scott, Madame Nina Margot.

Blue or Purple.—Argus, Baron von Brunow, David Rizzio, Grand Vedette, Non-plus-ultra, Prince Albert, Rembrandt, *Purpurea grandiflora*.

Cyclamen (*Cyclamen latifolium*).—Although popularly known as the Persian

seed-pan in a mixture of fine loam, leaf-mould, and a little sand, slightly covering the seeds, and placing them in a temperature of 60°, in a light position to prevent the seedlings from being drawn. When large enough to handle, pot them singly into thumb-pots, and in the spring re-pot into 60-sized pots, shading during bright weather. By midsummer they will have filled their pots with roots, and should then be moved into 5-inch pots. In potting do not more than half-cover the corms with soil. Place the plants in a low house or pit, and shade them in bright weather. Give plenty of air, and supply them with water regularly, syringing



Fig. 34.—*Cyclamen latifolium* (persicum)

Cyclamen, this race of garden plants has been bred from *C. latifolium*, a native of Greece and Syria. It was introduced into cultivation through Ghent about 170 years ago, by means of a small, white-flowered form with a purple base. Varieties were known in gardens a century ago, but the development of the large-flowered, rich-coloured varieties has taken place within the past fifty years.

There is no plant of moderate size that, when well managed, contributes so much to a floral display through the winter and early spring as the Cyclamen. It varies from pure white to crimson and purple. The seeds should be sown in August in an ordinary

overhead to keep down thrips, mite, and green-fly, which must be kept under or the leaves will be crippled and destroyed. The long, low, narrow span-roofed structures, with a sunk path down the centre, and a bed of earth covered with ashes on each side, raised well up to the light, that are so much used by market-gardeners, grow this and many other plants well. In winter give plenty of air, and keep the temperature from 45° to 50°. They are in flower from November to February, or longer if not allowed to seed.

When the plants have finished flowering, they should be placed in a low heated pit where they can be shaded. They will

soon show signs of resting by ceasing to make leaves, when they require less water. In early summer they should be started again by shaking them out of the old soil and repotting in pots of convenient size. The subsequent treatment should be that already detailed. These second-year corms will flower earlier and more freely, but the blooms may not be quite so large as first-year plants. It is not advisable to keep them after the third season.

There are now some very fine strains, remarkable for the size and shape of their flowers. Two of the most recent acquisitions are a crested variety raised by Messrs. Hugh Low & Co., with a raised feather-like crest on the petals; and the *Papilio Cyclamen*, of Continental origin, which differs from the type in having more or less fringed petals, spreading horizontally, wing-like. Both of these forms come fairly true from seeds.

Dahlia.—Introduced from Mexico in 1789. The form and colours of the flowers have been so much altered that we now have several distinct races showing almost every shade of red, white, yellow, and purple, as well as an infinite variety of mixtures.

There are nine well-marked groups or sections of Dahlia, viz. Show, Fancy, Pompon, Cactus, Single, Decorative, Pæony, Collarette, and Star, although at one time only two were recognized, namely, Show and Fancy. They were distinguished somewhat arbitrarily, Shows being white or yellow varieties, edged, tipped, or laced with a dark colour, after the manner of the Picotee; but when the disposition of colours was reversed, and the florets of a dark colour tipped with a lighter shade, or with Carnation-like stripes, they were called Fancies. The two classes are now generally merged in one, and known as Show varieties.

Single Dahlias.—These are slight variations of the wild type, reintroduced some fifty years ago, when it achieved a remarkable popularity, a large number of new varieties being soon raised from it. Beautiful as they are, and so well adapted for floral decorations, the fleeting character of their blossoms is against their use in this way—the petals quickly falling unless the blooms are gathered quite young. A race of dwarf varieties, known as Tom Thumb, originated with the late Mr. T. W. Girdlestone, who also enriched collections with many beautiful seedlings, possessing delightful combinations of colour.

Cactus Dahlias.—This popular section was

derived from *D. Juarezi*, a crimson-flowered species. The section takes its name from an imagined likeness to the bloom of a Cactus. By crossing it with others akin to it, numerous varieties bearing the peculiar Cactus-like character, and varying considerably in colours and combinations of shades, have been raised. The first seedlings were of tall growth, with few flowers, which were hidden by the foliage. The newer varieties are comparatively dwarf, free-blooming, and in not a few cases throw their flowers well above the foliage. Some of them, however, bloom somewhat sparingly, and for them no thinning of the shoots should be attempted.

Single Cactus, a recent development, comprises single forms of the Cactus type, with quilled and pointed petals; they are likely to gain general favour, being dwarf and very free of bloom.

Pompon Liliputian Dahlias.—These originated in Germany in the early part of last century as a sport from *D. coccinea*. At first of tall growth and flowering sparingly, they have been greatly improved, being generally of fairly dwarf habit, and remarkably free of bloom. The flowers are small, symmetrical, borne on long, stiff, erect stems, and of variable colours. For garden decoration they are unsurpassed; they are also popular as exhibition flowers.

Decorative Dahlias.—This group consists of free-blooming varieties of an intermediate and mixed character, and which are much employed for general garden purposes, though likely to be superseded by, if they do not entirely disappear in favour of, the greatly improved Cactus section.

Bedding Dahlias (fig. 35).—Under this name we have a group of dwarf, free-blooming varieties of the Show type, selected for their stiff, erect habit, and great wealth of bloom. They, with the Single Tom Thumb varieties, are useful to plant as an outside row in large beds of the taller-growing types.

Propagation.—The Dahlia is propagated by seeds, cuttings, division of the roots, or occasionally by grafting. The seeds may be sown in the end of March or the beginning of April, in pans filled with light rich soil, and placed in a bottom-heat of about 60°. A dung frame with a moist heat is invariably used by the raisers of seedling Dahlias. When the seedlings are about 2 inches high, they should be pricked out in small pots, gradually hardened off in May, and planted out in the beginning of June. Cuttings are obtained from the roots, which, having been kept through the

winter, are placed in moist heat in a little light soil such as leaf-mould, either under a stage in a warm house, or on a hot-bed, at a temperature of about 60°, in February or March. Shoots are soon sent up from about the crown, the first of which, being stout and hollow, are thrown aside, those that follow being more solid. They are planted singly in thumb-pots or round the sides of large 60-pots, in a sandy mixture, and placed in a close frame or pit in a temperature of 60° to 70°. The earliest cuttings

in a greenhouse or cold frame till the time of planting out.

Soil.—The Dahlia, to produce its flowers in perfection, requires a well-drained soil which is neither very light nor of a strong adhesive nature. Any good fresh loam will do exceedingly well. The ground should be prepared by deep trenching in winter, and if it is naturally poor, some turfy loam and well-decomposed cow-dung, or old hot-bed manure, may be mixed with the soil at the time of planting.



Fig. 32. Dahlia K. A. Victoria

take four or five weeks to root; those taken later will root in about half the time. When rooted, they are repotted, and returned to the frame until they are established, when they are hardened off and placed in a cold frame. Dahlias will not stand frost. It is well to pot the plants into 4- or 5-inch pots to get them well rooted for planting out in the open the first week in June.

Division of the tuber-bearing root-stock is chiefly practised where only a few strong plants are required. In this case place the roots in heat in March or April, and when the buds at the crown push, divide into as many parts as is necessary, preserving at least one bud to each piece, keeping them

Planting.—Any open situation, not shaded by trees, will suit the Dahlia. The taller varieties may be planted with good effect on each side of a walk, or in front of shrubbery borders. They also have a brilliant appearance when planted in groups. The dwarf varieties may be used for bedding in the flower-garden. For decorative purposes only those should be grown which have bright effective colours, and which carry their flower-heads on long stalks clear of the foliage. In the first week of June the plants may be put out in the open ground. It is the general practice to make a hole 18 inches in depth; place a spadeful of good manure at the bottom of

it, mixing with it some of the soil taken from the hole, and then planting, but a little deeper than the plant was in the pot. If the weather be warm and dry, a good watering may be given, and be repeated twice a week if drying weather continues. To keep the soil cool and moist about the roots a mulch of good manure is placed upon the surface after the plants start into vigorous growth. At the time of planting it is usual to stake the main shoot, tying it securely, but allowing space for it to swell.



Fig. 36.—Dahlia—Edith Jones

Vigorous-growing varieties will require their side-shoots to be staked also, or they will be stripped off by the wind. Syringing or watering overhead in the evenings of warm days is of great assistance to the plants, and in hot drying weather copious waterings at the roots is also necessary.

Dahlias grown for the production of exhibition blooms should have their shoots thinned if necessary, but where there is a tendency to large size and coarseness thinning should be sparingly done. A knowledge of the habit of the plant is necessary in this case. Those planted in borders for decorative purposes should be thinned out only enough to permit light and air to reach the centres of the plants. Flowers of light

colours intended for exhibition require to be protected from bright sunshine and storm. Liquid manure may be given with advantage to some varieties when the buds are swelling, but care is requisite, as an indiscriminate use of a strong stimulant may lead to the production of coarse flowers.

The earwig is a most troublesome pest to the growers of Dahlias, preying upon the young shoots early in the season, and later on injuring the buds and flowers by eating holes into the petals. The old-fashioned plan of inverting a flower-pot with some moss in it on the top of the main stake is still one of the best methods of trapping them. Slugs can be trapped by placing Lettuce or Cabbage leaves on the soil near the plants. Green-fly will infest the shoots of the plants in warm, dry weather, but constant waterings overhead by night will keep this pest in check; if not, then the shoots infested should be washed in an insecticide, such as 4 ounces of soft soap dissolved in a gallon of boiling water, applying it when cool enough.

As soon as autumn frosts destroy the foliage the stem of the plant may be cut away and the roots dug up, turning them upside down so that water may drain away from the hollow stem. Each root should be carefully labelled, superfluous soil removed from the tubers with a pointed stick, and then stored upright in a dry, cool, frost-proof place, beneath the stage of a greenhouse being suitable wintering quarters.

The following lists comprise a selection of the best sorts in each section:—

Twelve Show Varieties

- Chieftain*.—Purplish-lilac.
- David Johnson*.—Fawn-shaded rose.
- Florence Tranter*.—Blush-white, edged rosy-purple.
- John Walker*.—White.
- Maud Fellowes*.—White, tinted purple.
- Mrs. Gladstone*.—Pale pink.
- Queen of the Belgians*.—Pink.
- R. T. Rawlings*.—Clear yellow.
- T. W. Girdlestone*.—Rich purple.
- Warrior*.—Scarlet.
- William Powell*.—Primrose-yellow.
- Willie Garrett*.—Bright red.

Twelve Fancy Varieties

- Buffalo Bill*.—Buff, striped with vermillion.
- Comedian*.—Orange, flaked crimson and white.
- Dorothy*.—Fawn, striped deep maroon.
- Goldsmith*.—Yellow, striped bright crimson.
- Heather Bell*.—Scarlet, tipped white.
- Henry Clark*.—Lilac, blotched yellow.
- Janette*.—Yellow, tipped white.
- Mrs. J. Downie*.—Orange, striped scarlet.
- Peacock*.—Purple-maroon, tipped white.
- Prince Henry*.—Lilac, purple stripes.

S. Mortimer.—Rose, striped crimson.
Watchman.—Rich yellow, striped crimson.

Twenty-four Cactus Varieties

C. E. Wilkins.—Clear salmon-pink.
Coral.—Rich coral-red.
Cygnets.—Yellow, striped scarlet.
Duchess of Marlborough.—Delicate silvery-pink.
Empire.—Crimson, shaded scarlet.
Florodora.—Crimson.
F. W. Fellowes.—Terra-cotta red.
Harold Peerman.—Pale yellow.
Homer.—Maroon.
Hon. Mrs. Greville.—Orange-yellow.
H. Shoesmith.—Brilliant scarlet.
John Riding.—Deep crimson.
Mauve Queen.—Clear mauve.
Mrs. Charles Foster.—Rosy-pink.
Mrs. Douglas Fleming.—White.
Mrs. F. H. Cook.—Coppery-orange.
Mrs. Forrester Paton.—Crimson-scarlet.
New York.—Orange-yellow.
Perriot.—Deep amber, tipped with white.
Prima Donna.—White.
Richard Box.—Pale yellow.
Snowdon.—White.
Sweetbriar.—Clear pink.
Victory.—Rich coral.

Twelve Pompon Cactus Varieties

Coronation.—Scarlet.
Firefly.—Scarlet.
Gracie.—Yellow ground with scarlet, tipped white.
Little Fred.—Primrose.
Mignon.—Bright pink.
Molly.—White ground, striped crimson.
Mrs. H. B. Brandt.—Salmon-pink.
Niobe.—Pale primrose.
Peace.—Ivory-white.
Selma.—Rich rose-purple.
The Bride.—White.
William Marshall.—Maroon, shaded red.

Twelve Pompon Varieties

Annie Holton.—Crimson, tipped with silver.
Bacchus.—Crimson-scarlet.
Clarissa.—Pale primrose.
Darkest of All.—Dark maroon.
Emily Hopper.—Yellow.
Glow.—Rich coral.
Ideal.—Clear yellow.
Irene.—Pale rose-mauve.
Mars.—Bright scarlet.
Nerissa.—Soft rose.
Tommy Keith.—Red, tipped white.
Virginia.—White.

Twelve Decorative Varieties

Brentwood.—Yellow.
Crimson Flag.—Brilliant crimson.
Delice.—Fine pink.
Glare of the Garden.—Fiery scarlet.
Jeanne Charmet.—White, edged pink.
Loveliness.—Soft pink.
Orange Glare of the Garden.
Papa Charmet.—Deep crimson.
Souvenir de Gustave Douzan.—Orange-red.
Reginald Cory.—Brilliant crimson.
Warnford.—White.
White Cloud.—Pure white.

Twelve Pæony-flowered Varieties

Apollo.—Rosy-crimson.
Blush Queen.—Delicate pink.
Cassandra.—Orange-buff.
Delight.—Bright rose.
Firefly.—White, with scarlet edges.
Geisha.—Suffused-scarlet.
Liberty.—Terra-cotta red.
Mona.—Yellow.
Pantaloon.—Crimson tipped, white.
Salome.—Bright orange.
Sheila.—Rose-pink.
South Pole.—Pure white.

Twelve Collarette Varieties

Antverpia.—Crimson-scarlet, yellow collar.
Diadem.—Rosy-pink, white collar.
Eddystone.—Crimson, tipped golden-yellow, straw-coloured collar.
Eden.—Pure white.
Holyrood.—Rich ruby, golden tips, yellow collar.
Inchmarnock.—Red, yellow collar.
Madame Poirier.—Pansy-blue, white collar.
Maurice Rivoire.—Deep crimson, white collar.
Princess Louise.—Glowing crimson, white collar.
Queen Mary.—Brilliant rose, white disc and tips, blush-white collar.
St. Abbs.—Velvety-maroon, golden tips, straw-coloured collar.
Warspite.—Crimson-scarlet, yellow collar.



Fig. 37.—Star Dahlias

Six Star Varieties

Crawley Star.—Clear rose-pink.
Ifield Star.—Pale pink.
Orange Star.—Deep orange.

Scarlet Star.—Orange-scarlet.
White Star.
Yellow Star.

Twelve Single Varieties

Albatross.—Pure white.
Aurora.—Orange-red.
Beacon.—Golden-yellow.
Brilliant.—Crimson-scarlet.
Cardinal.—Cardinal-red.
Elsie.—Crimson, edged white.
Kitty.—Rosy-mauve.
Leon.—Scarlet.
Mikado.—Scarlet, with yellow margin.
Mrs. Joynson Hicks.—Pale buff.
Rosemary Bridge.—Deep rose.
Winona.—Deep maroon.

Delphinium (fig. 38).—A race of really superb hardy herbaceous perennials, which



Fig. 38.—Delphinium—Rev. H. Lascelles

have long been favourite border flowers, have been bred from *D. formosum* and possibly *D. Hendersoni* and one or two others. The blossoms of some of the single and

double varieties are of great size; the flowers are thickly set on the spikes, which are generally of considerable length and very symmetrical. The varieties, both single and double, vary in height, some being comparatively dwarf, others attaining a height of 6 or 8 feet and even more when the plants are well established. They are striking objects in the back row of a mixed border, or in a bed on a lawn. They flower vigorously in June and July, but their season may be prolonged by cutting out the flower-stems as soon as the flowers are over, which induces them to push up fresh spikes to flower in August and September. Seedling plants will flower even later. There is every shade of blue in their flowers, and some have white eye-like centres, some black, others brown or bronze. In some of the newer varieties there is a tinge of red.

Cultivation.—Delphiniums require an open deep, rich, mellow, loamy soil, well manured; and in cases where they are planted out for permanent service the roots should be lifted every two years at least, about the month of November, and replanted after the soil has been deeply dug and well manured. The position should be a sunny and open one. The plants should be mulched during summer, and be plentifully watered during periods of drought. Slugs and snails are often troublesome; they may be prevented from doing much mischief in winter by covering the clumps with coal-ashes.

Propagation.—This is done by division and seeds. The former method must be practised when particular varieties have to be increased. The best plan is to cut down the plants in July, and when they commence to grow again the young shoots should be cut off with a few roots attached. These should be potted singly in small pots and placed in a cold frame, and by the spring they will make good plants. The seeds are often slow to germinate, some of the sorts lying in the soil a whole year before growing. They should be sown as soon as ripe, in shallow boxes in a cold frame, and when large enough the seedlings may be planted out on a warm border. Seeds from a good strain, such as that of Messrs. Kelway of Langport, yield a large proportion of good forms. There are many named varieties, new ones being added annually.

Dracæna.—The garden representatives of this genus consist of four distinct groups, two of which are not Dracænas, but Cordylines. These groups are typified by: (1) *D.*

fragrans (Lindeni), an unbranched, sturdy plant with broad recurved leaves; (2) *D. Godseffiana* (fig. 39), a slender-stemmed, copiously branched shrub with ovate, spotted leaves, suggesting the common Aucuba; (3) *D. australis* and *gracilis*, which are Cordylines; and (4) *D. terminalis* and its numerous progeny, also Cordylines. *D. terminalis* was introduced from the East over a century ago, and since then numerous varieties of tropical origin have been obtained from different parts of the Old World. The most valuable additions, however, are due to the skill of the late Mr. Bause, who, about fifty years ago, obtained a batch of seedlings by crossing some of the most distinct of the varieties then in cultivation. He also showed, by his clever cultivation, that they might be grown into magnificent specimens. They are easily propagated from short sections of the

lateral shoots by cutting off their tops and keeping the plants dry for a few weeks. These



Fig. 39.—*Dracena Godseffiana*



Fig. 40.—*Dracena Sanderiana*

woody stem laid in light soil and kept hot and close, or they may be made to push out

shoots soon root in a tropical propagating-frame. To grow them well the young plants must not be allowed to get a check, but potted on frequently into a rich compost—loam, peat, and dried cow-manure in equal parts with sand being suitable. They should not be potted firmly. A position near the glass in a hot, sunny, moist house is best for them. Here they should be syringed overhead at least twice a day, and in the afternoon the house should be closed early to catch the last of the sun's heat. They must be shaded from bright sunshine. Thrips and red spider only attack them when the conditions are not exactly suitable. With this treatment it is possible to grow, in eighteen months, plants 6 or 8 feet high with healthy leaves down to the pot, and the upper ones richly coloured. For ordinary decoration less liberal treatment is preferable; the pots may be smaller, and the soil pressed in firmly, but unless the plants are kept regularly moist and clean they are certain to lose their lower leaves.

The group represented by *D. australis* is dealt with elsewhere. The other two groups, which are true *Dracenas* although so different in habit and foliage, require the cultural treatment detailed above. *D. God-*

seffiana is a useful decorative plant of recent introduction from west tropical Africa. Another pretty plant from the same region is *D. Sanderiana* (fig. 40), which has comparatively short, elegant leaves coloured green and cream-yellow. It is largely grown for table decoration. *D. Goldieana*, also from west tropical Africa, is an anomalous species with broad, zebra-marked leaves. It thrives under the treatment described above.

The following is a list of the best sorts:—

Baptistii.	Lindenii.
Bausei.	Lord Wolseley.
Beali.	Massangeana.
Cooperi.	Mrs. Wills.
Doucettii.	Norwoodiensis.
Gladstonei.	Princess Charles
Godseffiana.	of Denmark.
Goldieana.	Sanderiana.
Ignea.	Shepherdii.
Jamesii.	Terminalis.
Laingii.	

Epiphyllum.—There are three species of Epiphyllum, two of which, *E. truncatum*



Fig. 41.—*Epiphyllum truncatum*

(fig. 41) and *E. Russellianum*, have long been in cultivation. They are the parents of the numerous varieties grown in gardens. They are of slow growth, but not at all difficult to manage; they do not occupy much room, and are alike suitable for large or small houses. In the winter and early spring their beautiful purple, scarlet, and crimson shaded flowers are most effective either on the plants or in floral decorations. They are usually grafted on *Pereskia aculeata* to

form small standards. The stocks are raised from cuttings in winter or spring, and are grown on in sandy loam. They should be kept to a single stem, and, when about 1 foot or 18 inches high, grafted with small pieces of the *Epiphyllum*, and kept in a close, warm frame until they are united. They should then be grown on in a warm house until autumn, when they may be given less warmth and moisture for a time, to give them a rest, starting them again in February. By the end of July in the second season they should be nice plants, and if they are then exposed to direct sunshine in an airy house, so as to ripen the growth, they will flower freely. In winter they require no more water than is necessary to keep them from shrivelling, and a minimum temperature of 45°. The first batch of plants should be started in February in a temperature of 60°, giving enough moisture to keep the roots in a growing state; they will soon flower, when they can be moved into a cooler situation and another batch started. Thus treated they will last for many years, increasing in size, and producing annually a great quantity of their very attractive blossoms.

Plants grown from cuttings put in during the early winter, and struck in heat, should, when rooted, be placed in 3-inch pots, and grown on as directed for the grafted ones. The principal objection to these struck plants is that from their drooping habit they soon grow too much over the pot to be seen to advantage. They may, however, be grown in baskets suspended in a warm house. Very handsome examples of basket-grown Epiphyllums are a feature in some large conservatories.

Epiphyllums are subject to the attacks of scale and bug, which must be carefully removed. Green-fly sometimes attacks the young flower-buds; it can be destroyed with tobacco smoke.

E. Russellianum has small thin joints, a winged ovary, regular petals, few stamens, and a short stigma. It has had less influence in the production of the garden race of Epiphyllums than the sturdier *E. truncatum*, which has a smooth ovary, irregular petals, and a long, slender stigma. The third species is *E. Gaertneri*, which has joints 3 inches long, grey-green, with tufts of blackish hairs in between, and clusters of large regular orange-red flowers 3 inches wide, composed of about twenty spreading petals. It was introduced from Brazil in 1884. A variety of it called *Makoyanum* has less hairy joints,

and flowers of a different shade from the type.

Erica.—Although there is a close resemblance in the numerous species which constitute this genus, there is, at the same time, considerable diversity in the size and form of their flowers. This is especially true of the South African species, and the many garden hybrids raised from them. Most of the kinds flower from March to the end of August, a few being earlier or later, whilst several, such as *E. cerinthoides*, are in flower almost all the year round. Such early sorts as *caffra*, *gracilis*, *hyemalis*, *melanthera*, *persoluta*, *Willmorei*, and *Sindryana* bloom in the first months of the year. Some, such as *E. depressa*, last in bloom for about two months.

Most of those grown in greenhouses are of a more or less compact bushy habit; some, like *E. vestita*, with stout erect branches covered with comparatively long leaves, have the appearance of a miniature erect-growing Pine; others, like *E. cerinthoides*, are almost procumbent, their long, loose, straggling shoots requiring some support. *Ericas* are essentially sun-loving plants; they cannot bear a close atmosphere, or to stand too crowded together. For winter and spring decoration *E. hyemalis* and *E. Willmorei* are grown in large quantities in nurseries near London.

Propagation.—Heaths cross freely, and numerous hybrids have been raised in gardens. They are easily raised from seed, but it takes a good many years to obtain flowering specimens in this way. The seeds should be sown in pots of fine sandy peat in a greenhouse, early in the spring, and covered with a pane of glass, keeping the soil moist by periodically partially dipping the pots in water. As soon as the young plants are large enough to handle, pot them off singly in thumb-pots, keeping them close and shaded from bright sunshine until they commence to grow; then gradually inure them to more light and air. Nip out the points early, so as to cause them to throw out side-shoots, and the following spring move them into pots a size larger, and treat as hereafter advised for plants struck from cuttings.

Cuttings.—These should be formed of the ends of half-ripened lateral shoots. The soft-wooded kinds that make early growth should be propagated in the spring. The cutting-pots should be filled two-thirds full of crocks, over these a layer of fine sandy peat surfaced with silver sand. The cuttings

should be planted $\frac{1}{2}$ inch deep, putting them in moderately close; water gently, so as to settle the sand about them; cover with bell-glasses, and place in a temperature of 60°; wipe the glasses daily, and directly any sign of mould appears on any of the cuttings remove it, or it will quickly spread over all that are in the pot. Do not allow the sand ever to become dry.

The hard-wooded varieties commence



Fig. 42.—*Erica propendens*

growing later than the softer kinds, and the summer is considerably advanced before their cuttings are fit to put in. Treat them as advised for the soft-wooded sorts. In the following spring, pot them singly in thumb-pots, and keep the atmosphere about them somewhat moist and confined. Stop the points, to induce a bushy habit and to lay the foundation for the future specimen. Their progress is slow in the first stages of their existence, but do not allow them to become pot-bound before shifting them into larger pots.

Soil.—Heaths require to be potted in peat

of a harder or softer character, according to the nature of the variety; hard-wooded, slow-growing kinds requiring the soil to be of a closer, hard description. A mixture of two-thirds of heather peat with one of a softer nature will be found the best for these varieties, and equal quantities of each for the softer-wooded kinds. Good clean silver sand must be added, sufficient to keep the soil open and sweet, without which fine-rooted plants of the nature of Heaths cannot exist. The shift should be in proportion to the state of the roots and the nature of the variety. The slow-growing kinds do not require so much pot-room as the freer-growing soft-wooded sorts. Heaths may be potted at any season of the year, but the autumn or early in the spring are the most suitable seasons. The new soil should be made as firm as the old ball, or the water will escape without soaking the whole. After potting, the plants should have less air until the roots get hold of the new material. After flowering, the shoots of the softer-wooded sorts, *hyemalis*, *gracilis*, *candidissima*, *mammosa*, &c., should be cut back to within a few inches of the base of the shoot, keeping the plants on the dry side until new growth has started, when the roots may be examined, repotting if necessary.

Watering is a most important operation in the cultivation of these plants. They should never be watered until the soil has got fairly dry. This operation can only be satisfactorily performed by one who has had some experience in the management of Heaths.

House.—The house best adapted for growing Heaths is a low span-roofed one, standing north and south. No plants cultivated under glass are greater lovers of light than these. Shading should only be used whilst the plants are in flower. They require air in abundance at all times of the year, a confined atmosphere being most injurious to them, especially during active growth. Both side and top ventilators should be freely used, at the same time avoiding strong rushes of air or cold winds. Except in severely cold weather, the ventilators should never be closed. Heaths are liable to attacks of mildew, usually an indication of too close an atmosphere. It should be cured by dusting the parts affected with flowers of sulphur, and affording more air. They dislike fire-heat; they will bear anything short of actual frost, although it is not advisable to subject them for long to a temperature lower than from 36° to 40° during the winter. Fire-heat should therefore never be used in the

Heath-house unless there is actual frost, or in very damp winter weather, when it may sometimes be advisable to turn a little on early in the day to dry the air.

Plants in 5-inch pots and upwards may be placed in the open air from June until there is danger of frost. They grow freely during the summer, and are much healthier in every way when placed outside than when kept under glass.

S. = Soft-wooded. H. = Hard-wooded.

E. affinis.—Dwarf, sturdy; flowers lemon-coloured. S.

E. ampullacea.—Flowers waxy, inflated, white. There are several varieties. H.

E. Bergiana.—Small bush, purplish flowers. H.
E. Bowieana.—Erect; flowers white, tubular, in whorls. S.

E. caffra.—Dwarf, compact; flowers globose, white. S.

E. campanulata.—Flowers pendent, bell-shaped, yellow. S.

E. candidissima.—Dwarf, white bell-shaped flowers. S.

E. Candolleana.—Profuse flowerer, white, tinted with pale pink. H.

E. Cavendishiana.—Strong free growth; leaves deep green, flowers yellow. S.

E. cerinthoides.—Shoots long, straggling; flowers crimson. S.

E. colorans.—Leaves scattered; flowers clustered, club-shaped, white and rose. S.

E. depressa.—Dwarf, dense; shoots drooping, flowers yellow. S.

E. eximia superba.—Compact; flowers green and red. H.

E. exquisita.—Flowers large, waxy, deep pink. H.

E. florida.—Erect; flowers white, small, profuse. S.

E. gracilis.—Free, bushy; flowers small, globular, bright red. S.

E. grandinosa.—A loose, low bush, small leaves, white globular flowers. S.

E. hyemalis.—Very free, upright; flowers white and rosy-pink; winter; grown in immense quantities for decorative purposes. S.

E. intermedia.—Tall stiff stems, tubular white flowers. S.

E. jasminiflora.—Free; waxy tubular white flowers. H.

E. mammosa.—Free, bushy; flowers tubular, clustered, blood-red. S.

E. Massoni major.—Habit upright; flowers large, in whorls, red and yellow. H.

E. melanthera.—Free, bushy; flowers globular, pink with black anthers. S.

E. metulæflora.—Flowers erect, rose-pink. H.

E. mutabilis.—Free flowering, bright red. S.

E. Parmentieri.—Free; a profuse flowerer, rose. S.

E. Paxtoni.—Free in growth and flower; salmon-pink. H.

E. persoluta.—Like *E. gracilis*, but white. Summer. S.

E. perspicua.—Two forms, *erecta* and *nana*, both dwarf compact bushes with clusters of tubular bright-red flowers. S.

E. propendens (fig. 42).—Shoots drooping; flowers lilac. S.

E. Shannoni.—Good habit, free, white. H.

E. Spenceriana.—A dense bush, with tubular, lilac-pink flowers. S.

E. tricolor.—Numerous forms, free in growth, and abundant flowerers, the flowers inflated, flesh-coloured. H.

E. ventricosa.—All the many varieties are good, forming compact, healthy, green bushes with usually stout shoots which flower profusely, the colour of the flowers varying from white to red.

E. verticillata.—Loose habit; flowers in whorls, red. S. Var. *major* has larger flowers.

E. vestita.—Strong upright habit, flowers in whorls, reddish-scarlet. There are several varieties. July and August. H.

E. Willmorei.—Like *E. hyemalis*, but flowering later.

Eucharis (fig. 43).—A genus of beautiful white-flowered Amaryllids, natives of South America. There are six species, all of them in cultivation, and there are also now a considerable number of hybrids of garden origin. It is remarkable that the best species, *A. grandiflora* (*amazonica*), has not been found wild since its first introduction from Colombia in 1854. Twenty years later *E. candida* was introduced from the same country, followed by *E. Sanderi* (1882), *E. Mastersii* (1885), and *E. Bakeriana* (1890). The hybrids raised from these are not improvements on their parents. A hybrid between *E. grandiflora* and *Urceolina pendula* is an interesting plant, named *Urcecharis Clibrani*.

E. grandiflora is one of the most beautiful of all white-flowered plants. It can be made to flower at any time after it has made good growth and been rested. It is propagated by division of the clusters of bulbs. It delights in good loamy soil with as much sand added as will keep the whole in a sweet healthy state; drain the pots sufficiently and pot firmly, just covering the bulbs; place them in a temperature of 65° during the night, with a rise of 5° or 10° in the day, giving a little shade in bright weather, always affording enough light and air to prevent the leaves from becoming drawn. By midsummer they will be well rooted and will begin to throw up side-shoots, when a larger pot may be given. Encourage growth through the autumn up to the middle of November, and then rest them in a lower temperature, say 55° at night, withholding water until the leaves flag slightly, when a little water may be given, but not enough to saturate the soil; withholding it again until the leaves flag, when the watering may be repeated. Two months of this treatment will be sufficient, after which the soil can

be well soaked and the plants placed in a temperature 8° higher. Here they should push up a flower-stem from each bulb. After flowering, remove into pots 2 or 3 inches larger, and return them to a house or pit kept at a temperature of 70° by night, and proportionately higher by day. When the object is to get large specimens, keep them growing during the summer and autumn, and then rest them. When the pots are filled with bulbs, they can be made to flower twice a year.



Fig. 43.—*Eucharis grandiflora*

Insects.—The *Eucharis* is easily kept free from insects, for though brown scale, mealy bug, and black thrips affect it more or less, they can be kept under by sponging and the use of the syringe, the nature of the leaves being such that the pests are easily removed. The most injurious pest is the *Eucharis* mite, for which see article on INSECT ENEMIES, in Vol. III.

Freesia.—Freesias have become popular garden plants on account of the elegance and delicate perfume of their flowers. The pink-flowered *F. Armstrongii* was introduced to Kew in 1898, and by crossing it with *F. refracta* and its several varieties a charming race of coloured Freesias was originated, the first hybrid raised being named *F. kewensis*. Some years later Messrs. Van Tubergen, Haarlem, distributed several distinct colour forms. Others were raised by Mr. F. N. Chapman, Rev. Joseph Jacob, and Mr.

Fig. 44.—*Freesia refracta alba*

G. H. Dalrymple, and there are now many varieties of different shades of pink, rose, purple, and lavender, as well as pure white and yellow.

Cultivation.—The cultural requirements of Freesias are simple. Their growing season is our autumn and winter; and to ensure success the corms should be planted in August or early in September, in 5-inch pots, eight in each pot. They should be kept unwatered in a cool frame until they are in full growth, with their pots well filled with roots; they then enjoy liberal feeding with liquid farmyard manure and soot. They respond to gentle forcing, and may therefore be had in flower at Christmas. Forcing, however, generally results in weak growth and poor flowers. The growths require to be supported with thin sticks, as if once allowed to tumble over, they do not grow with any freedom. The best soil for Freesias is a light rich loam, dried cow-manure, and leaf-soil, with enough sand to render the whole porous. The corms may be planted out in cold frames, to supply stock for pot culture. They are easily raised from seeds, sown in slight heat in March to flower the following year. For this purpose 5-inch pots are suitable, thinning out the seedlings, as

they do not transplant well. After thinning, the treatment should be the same as for plants grown from corms.

The species of Freesia are *F. aurea*, *F. refracta* and its white variety *alba* (fig. 44), and *F. Armstrongii*. They are all natives of South Africa.

Fuchsia (fig. 45).—This genus comprises about fifty species, mostly natives of Central and South America. They vary considerably in habit and in flower-characters, but the majority are sufficiently attractive to deserve a place among garden plants. Those commonly grown are either seedling-sports or hybrids of garden origin, *F. macrostemma* being the species principally used in their production. This was introduced in 1790 and distributed as *F. coccinea*. The first recorded hybrid was raised in 1830, since when a great number of hybrids and seedlings have been added. The principal breeders of Fuchsias were M. Lemoine, Mr. George Fry, and Henry Cannell.

It would be difficult to name a plant more generally useful than the Fuchsia. The ease with which it can be grown as to both



Fig. 45.—Fuchsias

1, *Macrostemma*. 2, Mrs. H. Roberts. 3, Buffon.
4, General Gordon

soil and situation, its flowering for the greater part of the year, in almost every size from the tiniest up to the largest specimens in pots or planted out, or clothing a rafter or lofty conservatory pillar, mark it as an ideal garden plant; while out-of-doors, in the open border, it forms an important feature, unsurpassed for its drooping elegant habit and the profusion of flowers produced, until cut off by frost. They may be grown so as to have plants in bloom from early spring until October.

Propagation.—The Fuchsia may be treated as an annual, good plants being possible in about six months from seeds sown in February in pans covered with glass and placed in gentle heat. When the plants are large enough to handle, put them into small pots, keeping them tolerably moist. The compost should be two parts of good meadow-loam, one of leaf-mould, and one of silver sand. As they require more root-room they must be moved into pots of 3 or 4 inches in diameter. When established they should be moved to a shelf in a warm greenhouse. If large plants are wanted, the flower-buds should be taken off and the plants kept growing as long as possible. At the beginning of March move them into 6-inch or 8-inch pots, adding some well-decomposed cow-manure to the compost; give them a little more warmth, syringe overhead every afternoon, and later on shade slightly from the sun when it is powerful. Do not stop the plants, as is usual in the case of such as are intended for specimens, for if left to themselves in this way, the habit of each can be more easily seen. A natural disposition to throw out plenty of side branches, and to form a dense compact pyramid, is of very great importance, for, however finely formed the individual flowers may be, a loose straggling habit renders the variety worthless. Any that are sufficiently distinct, and improvements upon existing kinds, should be retained, and such as are deficient at once discarded.

Fuchsias will strike readily from cuttings at any time of the year when shoots can be obtained in a free-growing condition, not disposed to flower; these latter do not either root or grow freely, and should be avoided. The most usual method is to place old plants in warmth about February, and as soon as they have pushed shoots two inches long, to take them off and put them in small pots or pans, an inch apart, placed in a temperature of 60°; they will root in two or three weeks, when they

should be moved singly into 3-inch pots. If well attended to with water, and shaded when the sun is bright, they will grow rapidly, and must be again shifted into 7-inch or 9-inch pots as soon as those they already occupy are moderately filled with roots. Stop both leading shoot and side branches two or three times during the spring, staking the former so as to keep it upright. Syringe freely every afternoon, not only to promote growth, but to keep down aphides and red spider. By mid-summer, under the influence of sunny weather, the plants will be more disposed to flower than to grow.

If exhibition specimens are required, cuttings should be put in about the end of July, and, when well rooted, potted into 4-inch pots, keeping them through the autumn and winter on a shelf near the glass in a night temperature of 50°. At the end of February move them into 10-inch or 12-inch pots, according to the state of their roots; raise the temperature 5°; shade as the sun gets powerful, and stop both leaders and side-shoots. By the end of April they will be in a condition to move into 16-inch or 18-inch pots. Attend to them, with slight shade and air, as hitherto, and they will grow rapidly and commence flowering. The extra allowance of root-room will enable them to keep on flowering for a much longer time than if in smaller pots. After the last potting, a portion of the plants may again have the points of the shoots pinched out, which will cause them to flower later.

Early-bloomed plants may, when getting past, be placed out-of-doors for three weeks in the summer to harden; then, after shortening the shoots to about half their length, replace them under glass, and syringe freely. In about a fortnight they will have broken into growth; then turn them out of the pots, reduce the soil a little, and give them a size larger pot, encouraging growth by syringing in the afternoons. So treated, they will flower well through the autumn.

Fuchsias are highly decorative when treated as greenhouse climbers. For this purpose they should be grown on a single stem, and, when about 6 feet long, planted out so that the stem can be trained against a rafter. As the lateral shoots develop they may be stopped, and this results in a canopy of shoots which hang gracefully and flower continuously all summer. When at rest, they should be severely pruned and cleaned as though they were Vines.

A Selection of the Best Varieties

Amy Lyle.	Mrs. H. Roberts.
*Ballet Girl.	Mrs. Marshall.
*Beauty of Exeter.	Mrs. Todman.
*Brilliant.	*Nautilus.
Charming.	Olympia.
*Duchess of Edinburgh.	*Phenomenal.
Elegance.	*Phenomenal White.
*Flocon de Neige.	*President Felix Faure.
General Grenfell.	Princess May.
General Roberts.	Rose of Castile (improved).
Gertrude Pearson.	Royal Purple.
*La France.	
Lustre.	

* Double flowers.

Gaillardia (fig. 46).—The numerous popular garden forms of this genus have

Fig. 46.—*Gaillardia aristata* (var.)

been raised from *G. aristata* and *G. pulchella*, natives of North America. The forms and colours of the flowers have been materially modified, but all have a brown or black disc, excepting one called Vivian Grey, which has a yellow disc. There are varieties with quilled yellow and crimson florets, resembling the Trumpet Honeysuckle, others with two rows of ray florets, and others entirely double. Gaillardias make a grand display in the garden from

June to October, never suffering from drought in the hottest and driest of summers, and growing freely in any soil. They stand any ordinary degree of cold without the slightest protection, the plants bursting through the earth's crust freely after a severe winter. They may be transplanted at almost any time of the year, but if done between February and July, they bloom freely the same season. Although they thrive in any kind of soil, they are all the better for deep digging and manuring. The flowers are invaluable as cut bloom, lasting quite a week in water. The named varieties may be increased by means of root cuttings.

Some of the best varieties are: Baden Powell, Cormorant, Irene, Ireland, John Stormouth, Lady Rolleston, Langport Wonder, Masterpiece, Matador, Mrs. E. Lascelles, Rownham's Queen, Sunset.

Gladiolus.—From this large and diversified genus, which is chiefly South African, four distinct garden races, known as *Gandavensis*, *Lemoinei*, *Nancyanus*, and *Primulinus*, have been raised. The first-named is supposed to be the result of crossing *G. psittacinus* and *G. cardinalis*, Dean Herbert among others having made this cross about ninety years ago. The well-known typical *G. Gandavensis*, thus named by Louis Van Houtte, was one of the first of the hybrids thus obtained. Since then numerous crosses and seedlings have been raised by English, French, and Dutch breeders, the most successful perhaps being the late Mr. James Kelway, his strain being remarkable for length and thickness of flower-spike, large size of flower, and great range of colour. Mr. Burrell of Cambridge is also a successful breeder and exhibitor of this race. The plants ripen seeds freely under cultivation, but the varieties do not come true from seed. To obtain a good strain, the best varieties should be crossed with each other. The seeds should be dried as soon as ripe, and kept dry until April, when they may be sown in boxes in a frame, or in the open on a sunny border—in short, treating them much the same as if they were seeds of Onions. The small bulblets or "spawn" produced about the bases of mature corms should be collected, dried, and sown as recommended for the seeds. Of course they reproduce exactly the parent plant.

The *Lemoinei* race was raised by M. Lemoine of Nancy in 1875 from *G. purpureo-auratus*, crossed with good varieties of the *Gandavensis* race. It is distinguished by its hooded flowers, and by its rarely

having more than four to six good flowers open at one time on the spike. It is supposed to be hardier than the *Gandavensis* race, and in some gardens the corms have flourished when left undisturbed in the ground year after year.

The *Nancyanus* race (fig. 47) was also raised by M. Lemoine, who in 1883 crossed *G. Saundersii* with some of the best of the forms of the *Lemoinei* race. Practically the same cross was made about the same time by Max Leichtlin, who raised hybrids between *G. Saundersii* and forms of *G. Gandavensis*; these were distributed under the name of *G. Childsii*. This race is remarkable for the large size, openness, and rich varied colours of its flowers, and although the spikes are less crowded with flowers and less rigid than those of the *Gandavensis* race, they are none the less beautiful.

The *Primulinus* race has been bred from a yellow-flowered species, *G. primulinus*, which was introduced from tropical Africa about thirty years ago. By crossing it with the other sections a large number of showy hybrids have been obtained. They are distinguished by the hooded top segment of the flower. *G. primulinus* itself is a charming plant, its flowers being of a clear primrose-yellow colour.

The cultured requirements of all the sections are essentially the same. The soil should be light and loamy, well drained if of a clayey character, and deeply trenched. In October the bed should be dug over and a layer of rotten manure worked in. On a dry day in March it should be hacked over with a fork or hoe, and drills made 18 inches apart and 3 inches deep. Large corms should be planted a foot apart. If the corms are planted fortnightly from the end of February till the middle of May, a succession of flowers is secured. When the spikes are strong, they should be staked, and from now onwards weak liquid manure may be given. Should the weather be dry, a mulch of light manure preserves the corms and roots against heat and drought. The corms should be lifted as soon as convenient after the flowers have faded and before the leaves decay. When dried, the stems should be taken off the corms, and the latter stored in a dry shed or fruit-room.

Pot Culture.—Some sorts of *Gladiolus* are successfully grown in pots for conservatory decoration. For this purpose they should be planted in 6-inch pots in March or April, using a rich loamy compost. They

should then be plunged in the open ground or placed in a cold frame until they have made some growth. The sorts for pot culture are the early dwarf *Gladiolus*, generally known in gardens as *nanus* and *ramosus* section. They include *G. Colvillei* and its varieties *alba* and *The Bride*. These should be planted in 6-inch pots in October to flower in March or April, placing five or six bulbs in each pot, which should be



Fig. 47.—*Gladiolus Nancyanus*

well drained, as they take copious supplies of water when in full growth. They are largely grown by market gardeners for cut flowers, as most of them will bear gentle forcing. These sorts are hardy enough to succeed in a warm sheltered border, where they usually flower during June and July. To do this they should be planted in October or November, 4 inches apart and 6 inches deep, and it is as well to spread some light litter over the beds after planting. When established, they may remain undisturbed for several years.

EARLY-FLOWERING SORTS

Nanus Varieties.
 Ackernanni.
 Cardinalis Elegans.
 Colvillei.
 „ var. Alba.
 „ var. The Bride.
 Delicatissima.
 Fairy Queen.
 Fiery Knight.
 Fire King.
 Peach Blossom.

Queen of Holland.
 Salmon Queen.
 Sarnian Gem.

Ramosus Varieties.

Insignis.
 Non Plus Ultra.
 Prince Albert.
 Queen Victoria.
 Rosea Maculata.
 Van Spyck.

LARGE-FLOWERED SORTS, WHICH BLOOM IN AUGUST

America.
 Attraction.
 Augusta.
 Baron Jules Hulot.
 Blue Jay.
 Brenchlyensis.
 Canarybird.
 Czar Peter.
 Dawny Dick.
 Electra.
 Europe.
 Empress.
 Faust.
 General Pellissier.
 Golden King.
 Golden West.
 Goliath.
 Gounod.
 Halley.
 Hollandia.
 Klondyke.
 La Charmante.
 La Luna.
 Lily Lehman.

L'Immaculée.
 Loveliness.
 Lucretia.
 Majestic.
 Mars.
 Mauve Clair.
 Mephisto.
 Mrs. Francis King.
 Niagara.
 Nora.
 Panama.
 Panama White.
 Peace.
 Pink Beauty.
 Pink Perfection.
 Princeps.
 Prince of Wales.
 Queen of the Yellows.
 Rochester White.
 Safrano.
 Sulphur King.
 Surprise.
 William Copland.
 White Excelsior.

PRIMULINUS SORTS

Ada.
 Albion.
 Asia.
 Aurora.
 Butterfly.
 Corona.
 Goldflake.
 La Rève.
 Lemon Queen.
 L'Unique.
 Maiden's Blush.
 Mrs. Grullemans.

Orange Brilliant.
 Reine Victoria.
 Rose Gem.
 Rose Luisante.
 Royal Sovereign.
 Salmon Queen.
 Solfaterre.
 Sunrise.
 Sunset.
 Tea Rose.
 Vanessa.
 Yellow Perfection.

Gloxinia.—Although represented in gardens by several distinct races or types, there does not appear to have been more than one species concerned in the development of Gloxinias, namely, *G. speciosa*, which was introduced into England from Brazil in 1817. A larger form of it was obtained from the Organ Mountains by Messrs. Veitch in 1842, and several other named varieties have at different times been imported from Brazil. They all have nodding flowers with narrow tubes, and their colour is either purple or white. The bright-

scarlet, blue, pink, and mottled forms with erect flowers are all of garden origin.

Propagation.—Gloxinias are raised from seed sown early in spring, and treated as for Begonias. They are transferred into 3-inch pots when the leaves are an inch or so long, and as soon as they have made a fair amount of roots, they are shifted into 6-inch pots, using for them loam in the proportion of three parts to one of leaf-mould, with enough sand to keep it open. Cuttings of the leaves are also used for the propagation of special sorts, a mature leaf, with a small portion of the stalk attached, being inserted in sandy soil, in small pots, placed in heat, shaded, but not kept too close or they are liable to damp. Or the leaves may be cut into sections, an inch square or so, cutting clean through a principal vein or rib, and used as cuttings.

After the plants have flowered, the soil is kept moist until the leaves wither, when the tubers are shaken free of soil and stored through the winter in dry sand in a temperature of 50°. They may be started again at several different times so as to give a succession through the summer. They are planted in 4-inch or 6-inch pots, and placed in a temperature of 60°, in full light, or they become drawn. When well-rooted, they are repotted into 8-inch pots, in which they will flower. They dislike a close, moist atmosphere. To prolong their blooming season, manure water is given as soon as the flowers begin to unfold. There are numerous named sorts, but if seeds of a good strain are obtained from a reliable source, flowers of first-rate quality and sufficient variety may be expected. The colours are reproduced fairly true from seeds.

Hippeastrum (*Amaryllis*).—A popular genus, much improved by the hybridizer and cultivator in recent years. The best known species is *H. equestre*, introduced from the West Indies in 1778. *H. Reginae* flowered at Hoxton in 1728, and was so named because it flowered on the birthday of Queen Caroline, wife of George II. *H. vittatum*, introduced from Peru in 1769, is interesting because the first hybrid was raised from it and *H. Reginae* by a watch-maker named Johnson in the year 1799, and was named *Johnsoni*. Dean Herbert enumerates in his *Amaryllidaceae* (1837) thirty-one hybrid Hippeastrums, all, except four, raised by himself. Amongst them was one with pale orange-coloured flowers (*H. Herberti*), since lost. In 1830 De Graaf of

Leyden began to hybridize *Hippeastrums*, using as breeders *H. vittatum*, *H. Johnsoni*, *H. fulgidum*, and *H. crocatum*, and to him and his son English raisers are greatly indebted for many of the crosses employed in the further improvement of the race. The introduction of *H. pardinum* in 1861, and of *H. Leopoldi* in 1869 from Peru, gave a new impetus to the work of the breeder, and it is to the influence of these two species that we owe the full, rounded flowers known as the florists' type. The late Messrs. Veitch & Sons of Chelsea produced many very fine seedlings. Other breeders of these plants have been Sir George Holford, West-nbirt; the late Mr. Joseph Chamberlain, Highbury; and the Royal Gardens, Kew.

Cultivation.—The soil should be composed of three parts fibrous yellow loam, and one each of fibrous peat, leaf-mould, and rotten straw-manure. Double the quantity of leaf-mould may be used without peat, or a double quantity of peat without leaf-mould. Some coarse white sand should also be added. A good time to repot the bulbs is the second week in January, when they are at rest. Pots of 4 and 5 inches for the smaller bulbs, 6 inches for medium-sized ones, and 7 or even 8 inches for the largest should be used. Shake the bulbs free of all old soil, remove all dead roots, and see that the bulbs are quite sound. Any offsets that have formed separate roots and are attached rather loosely to the sides of the old bulbs should be removed and be potted separately in 60 pots. Press the soil firmly about the bulb and roots, so that, when finished, about half of the bulb is covered. The soil should be worked in with the fingers, and not with a wooden rammer. Then plunge the pots up to the rims in spent tan, where they can have a bottom-heat of from 75° to 85°. The temperature of the house ought not to be more than from 55° to 60° to start with. Give no water for at least two weeks after repotting, when new roots will be formed and some growth made. In about three weeks both leaves and flower-scapes should show, when the temperature may be increased 5°. Two weeks later a minimum of 60° will be most suitable. The bulbs, which were plump at potting-time, now shrink rapidly, their substance going to make leaves and flowers. Careful cultivation should be continued for some time after the flowers are over, in order that the bulbs may become strong and well developed for next year's flowering. The bulbs start into growth better

if the tan bed is turned over, and some quicklime added to destroy vermin, replunging the pots over the rims, so that the roots may push out from the top and run into the tan, which they readily do. After this they do not need water oftener than about once a week, when the entire bed should be well watered. In a few weeks it should be quite a mass of roots. Growth continues until the end of August, or later, when water must be withheld, and the house well ventilated night and day. Light shading is necessary only when the sun is powerful. When sound bulbs of large size do not flower, it is owing to mismanagement the previous season. Under proper treatment not five per cent will miss flowering.

Hippeastrums are easy to cross-fertilize. The anthers must be removed when the flowers are less than half-opened; about two days later the stigma is ready for fertilization with ripe pollen from another flower. The operation should be performed daily until all the flowers are fertilized. Only the best varieties should be used as breeders. The seed should be ripe in May or June, and it may be sown at once, about fifty in a 6-inch pot, in bottom heat. When about a fortnight old, prick out the seedlings, putting a dozen or so in a 6-inch pot. They should be kept dry in a warm greenhouse in winter. In January repot them, putting three plants in a 5-inch or 6-inch pot. Plunge them in bottom heat, and treat them exactly as for the large bulbs. Seedling bulbs do not lose their leaves in winter. They must, however, be rested from November to January, when they may be planted singly in 5-inch pots, and with good culture they will form flowering bulbs by the end of the season.

Hippeastrums are subject to basal rot, caused probably by excessive watering. They are also liable to attacks from red spider, thrips, and mealy bug. Red spider appears usually in hot dry weather. It should be kept under by daily syringing when the house is shut up in the afternoon. Thrips are destroyed by tobacco fumigation, or washing the leaves with tobacco water. Mealy bug is nearly always present under the outer coatings of the bulbs, or at the base of the leaves, causing them to die off prematurely. They are also subject to attacks of the bulb-mite, usually an indication of improper cultivation. Full directions for its suppression will be found under "Bulb Mite" (Vol. III, p. 172).

The named hybrids and seedlings are now very numerous, at least 200 having received certificates from the Royal Horticultural Society. New sorts are raised and named every year for trade purposes, but they are short-lived, and seedlings from a good collection are of such a high standard that it is not necessary to trouble about names.

The best of the species are: *solandri-florum*, *aulicum*, *psittacinum*, *paradinum*, *Reginæ*, *Leopoldi*, *equestre*, *reticulatum* var. *striatifolium*, *procerum*, *vittatum*.

Hollyhock (*Althea rosea*).—A native of China, but has been an inhabitant of our gardens for more than three centuries, although it is only within the last century that attempts to improve it have been made. The Hollyhock may be said to have reached its highest popularity in the sixties. About this time, however, a deadly fungus, *Puccinia malvacearum*, attacked it, destroying several leading collections, a considerable number of the finest named varieties being wholly lost to cultivation through it. In recent years this terrible disease has been less injuriously active than formerly, with the result that the plant appears to have regained much of its former vigour. New varieties are again being raised, and the Hollyhock is again prominent among border plants.

The single-flowered forms are also to be recommended. They seed very freely, are happy under ordinary conditions, they grow well and flower most profusely, and they are of varied colours. There are no more stately border plants in July and August. In proportion as the flowers of the double varieties approach the highest quality, seed-production is limited. Consequently there are many more expanded blossoms on a spike at one time, and they are much more lasting. This makes the double-flowered varieties preferred by some, notwithstanding their tendency to fall a prey to the fungus disease and their more special requirements.

Propagation.—Named varieties are increased by means of cuttings or grafts or division. Cuttings are made from the young shoots taken off close to the old root-stock when they are 3 inches long. They are planted singly in small pots of light, sandy soil, and placed in a cold frame, where they are sprinkled and shaded till rooted. If slow in rooting, they may be forwarded by a gentle bottom-heat; those put in between October and March should always have heat.

Grafting is done both in autumn and spring, the former being the best time if proper shoots to use as scions are obtainable, which is not always the case, especially if the plants are allowed to seed: as then some time elapses before they throw up shoots. It is usual to use as a stock the root of some inferior variety. The plants may be lifted in autumn or spring, and divided with a spade in the ordinary way.

Seeds sown in January and February on a gentle bottom-heat, with careful after-treatment, will afford a stock which, if planted out in early summer in the open, will flower the same year, permitting of the selection of the best varieties to be retained. Or they may be sown outdoors about the end of June, in drills a foot or so apart. When fit to handle, they should be transplanted in lines 2 feet apart, and some 15 inches from plant to plant. They should make strong plants by autumn, and towards the end of October or beginning of November they should be planted in their flowering quarters.

Soil.—The Hollyhock is a gross feeder, and should have a deeply-dug and well-manured soil. The old growers trenched their ground, working in an abundance of manure; and after the plants had become established, they were mulched with half-decomposed manure, and copious waterings given. Such liberal treatment resulted in vigorous growth and fine spikes of bloom. No plant more readily answers to liberal culture, or suffers more when starved in poor soil. The tall stems should be supported with stout stakes quite 5 feet high.

The Hollyhock is perfectly hardy, but it is liable to harm from excessive moisture in winter if on low-lying or imperfectly-drained ground; when it is sought to establish a permanent plantation, this fact should be borne in mind. In cold and moist northern localities it is customary to lift choice varieties in autumn, and either pot them or plant them out in a prepared bed in a cold frame.

Hyacinth (*Hyacinthus orientalis*).—One of the best-known of garden flowers, with a history which goes back some 350 years. Gerard (1596) mentions purple, white, single, and double blue varieties, and Philip Miller states that in the early part of the eighteenth century 2000 varieties were enumerated in the catalogues of the Dutch growers.

Hyacinths are most successfully grown in and near Haarlem in Holland. There the soil is almost pure fine sand, but this is

enriched with frequent dressings of cow-manure. It is probable that the Hyacinth might be grown to as great perfection in England as in Holland, for our climate is as suitable as that of Haarlem. It is a mistake to suppose that the bulbs degenerate in England.

Propagation.—The Hyacinth seeds as freely in England as in Holland, and the seeds, if sown as soon as ripe, in boxes in frames, in sandy soil, germinate freely. Offsets from the old bulbs may be planted in beds of rich soil in the autumn. The general method of propagation, however, is by means of the small bulblets developed at the base of the cross-cut bulbs (fig. 48). They form in the incisions, often profusely,



Fig. 48.—Hyacinth Bulb with Offsets

and are removed and planted in beds, where they make some growth the first year and form nice little bulbs. The best bulbs require four years' growth, but many are sold when only three years old.

Culture in Beds.—The Hyacinth is planted in almost every garden, public or private, for spring effects. It requires a light rich soil of moderate depth, with an annual dressing of decayed manure. If the soil is heavy, sand spread on the surface and dug in is of much value. Where leaf-mould can be obtained, it is excellent to mix with the sand. The soil should be well worked and in good condition before planting in October. The bulbs should be set about 4 inches in depth, with a little clean sand under and over them. If planted well and in good soil, and allowed to ripen naturally before they are taken out of the ground, afterwards drying them in an airy shed, not in the sun, they may be used again the following year. Remove all offsets as soon as the bulbs are dry, and plant them in a bed, the large flowering bulbs only being kept to plant

again for flowering. A few of the larger offsets may produce a flower-spike, but they cannot be depended upon.

Culture in Pots.—Hyacinths are easily cultivated in pots to the highest standard of excellence. It is important to obtain the very best bulbs for this purpose. To ensure a succession of bloom, a few dozens of the earliest varieties should be potted about the middle of September in 5-inch pots, putting in the main batch a month later. November is too late for good blooms. The soil, which should be prepared in August, should be rich; good loam two parts, manure one part, leaf-mould one part, and sand one part, well mixed, and left in a heap in the open air until it is used. The best manure is equal parts of cow-manure and horse-droppings mixed in a heap until fermentation takes place, turning it frequently to prevent overheating. In a month it will be ready for use. Drain the pots with three or four crocks. A little sand should be placed under each bulb and the compost pressed in firmly, leaving the crown of the bulbs about level with the surface, finally covering the crowns with sand. The pots may then be placed on a hard bottom of ashes, and covered with coco-nut fibre, decayed tan, or leaf-mould. Coal-ashes are sometimes used, but the other materials are preferable. The layer above the top of the pots ought to be about 4 inches deep. Those intended to flower early should be taken out of the plunging material as soon as the roots have reached the side of the pot, inverting a small pot over the crown for a few days until the crown has become green. The bulbs not intended for forcing need not be disturbed until early in January, when they may be placed in a frame, kept close for a few days, and shaded with mats until the leaves lose their blanched appearance. They must be protected from frost whilst in the frame. The Roman Hyacinth (fig. 49) is a distinct variety with slender spikes of white flowers. It is largely grown for forcing in winter.

Hyacinths do not require large supplies of water, notwithstanding that they will grow and flower well with their roots permanently in water. About once in a week at first is often enough, and even when in full growth two or three times a week are usually sufficient. Weak liquid manure may be given weekly during active growth. The plants should always be placed near the roof-glass to prevent the leaves and spikes

from being drawn and weakly. In forcing avoid a high temperature; 55° to 60° is high enough in winter. As soon as the flowers at the base of the spikes begin to open, remove them to the cool house or frame to develop fully. The spikes will require support. The neatest is of stoutish wire bent at the end and inserted in the soil without injuring the bulb; if neatly affixed the support is quite hidden by the leaves and flowers. When the flowers fade they should be cut off, and the bulbs placed out-of-doors or in a frame to ripen.

Select List of Varieties

Single Red.—Etna, Garibaldi, General Pelissier, La Victoire, Robert Steiger, Roi des Belges.

Single Pale-red and *Deep-rose*.—Duchess of Albany, Gertrude, Koningen Wilhelmina, Sarah Bernhardt.

Single Pink.—Cardinal Wiseman, Gigantea, Jacques, Moreno, Pink Perfection, Rose à Merveille, Roy Gem.

Single White.—Albertine, Baroness van Tuyll, Blancheur à Merveille, La Grandesse, Madame van der Hoop, White Lady.

Single Rosy-white.—General Vetter, Grandeur à Merveille, Lady Clinton, Mr. Plimsoll.

Single Blue.—Baron van Tuyll, Captain



Fig. 49.—Roman Hyacinths

Culture in Glasses.—Hyacinths are easily grown in glasses in rooms, the glasses being filled with rain-water and the bulbs placed so that the water just touches them. The glasses should then be placed for a few weeks in an ordinary cupboard or similar dark place, removing them into the light again when the roots are about 4 inches in length. A few days afterwards they should have all the air and light possible. The glasses should be kept filled up with water of the same temperature as the air in which the plants are growing. A few pieces of charcoal placed in the glasses when the bulbs are set in them helps to keep the water from stagnating.

Boyton, General van der Heyden, Grand-maitre, King Alfred.

Single Light-blue.—Czar Peter, Johan, La Peyrouse, Perle Brillant, Regulus Schotel.

Single Dark-blue.—King of the Blues, Master-piece, Menelik.

Single Purple.—Distinction, Lord Balfour, Mauve Queen.

Single Yellow.—City of Haarlem, King of the Yellows, La Grande Jaune, Primrose Perfection, Yellow Hammer.

Double White.—Bouquet Royal, La Grandesse, Princess Alice, Edison, Isabella.

Double Blue.—Blokberg, Delicata, Garrick, General Köhler, Van Speyk.

Double Red.—Bouquet Royal, Koh-i-noor, Noble par Mérite, President Roosevelt.

Double Yellow.—Gæthe, Sunflower.

Iris.—A beautiful genus comprising

nearly two hundred species, many of them being popular garden plants. The common *Iris germanica* (fig. 50), or "Flag Iris", and the bulbous kinds, like the English and Spanish (fig. 54), have varied from seed so profusely that their forms are well nigh innumerable. It is quite possible to have some species of Iris or other in bloom every day in the year, and many are so abundant and grown so easily that the name of "Poor Man's Orchids" has been applied to them.

The genus may be divided roughly into: (a) *rhizomatous* and (b) *bulbous* species. The evergreen Flag Irises are rhizomatous, and are divided into "bearded" and "beardless" groups. The "Cushion" Irises, such as *I. Susiana*, *I. Gatesii*, and *I. Lortetii*, are very remarkable in size, form, and colouring, and they are worth all the special care required to succeed with them.

The best authority on Irises is Mr. W. R. Dykes, secretary of the Royal Horticultural Society, author of a beautifully illustrated monograph of the genus. Messrs. Barr & Sons, of Long Ditton, and Messrs. Wallace & Co., Colchester, have the finest collections in the trade.

Culture.—The different sections of Iris are so varied in habitat and in constitution that no one system of culture can be adopted for them. Thus our native marsh Iris and its variegated forms love water-margins and boggy ground. A similar position also suits the Japanese *I. laevigata*. On the other hand, it is scarcely possible to plant *I. germanica* and all its forms, or the bulbous *I. xiphioides* and its allies, in too warm and dry a soil. Most of the strong-growing rhizomatous kinds thrive in any good garden soil. The Algerian *I. stylosa* requires to be judiciously starved to make it flower, and, as it does this in mid-winter and early spring, it requires a sheltered position. The beardless, rhizomatous kinds grow in any good well-worked garden soil.

One of the sweetest of all dwarf bulbous Irises is *I. reticulata*, which now and then increases rapidly in good loam, but requires special treatment on heavy soils. A bed for it may be dug out and well drained, and filled with fresh turfy loam well matured. Plant the bulbs about 3 inches deep and apart on a thin layer of coco-nut fibre and clean sand well mixed together. They may be dug up and replanted every year.

The gorgeous Clematis Irises of Japan (*I. laevigata*) require special treatment, though on deep rich holding soils we have seen

them beautiful in beds or in the mixed herbaceous borders. Being semi-aquatic, however, they are only seen at their best when grown at the water's edge. Mr. Peter Barr, writing from Japan in June, 1899, says: "The Japanese grow this Iris in their rice-fields, which are flooded during summer but drained off in winter, by means of ditches, into the nearest creek, pond, or river. During winter, while the plants are at partial rest, they receive three to five waterings with liquid human or cow manure



Fig. 50.—*Iris germanica*

(not horse-manure, which is unsuitable). As soon as the plants start into growth in the spring they receive no more manure, but water is again let in 1 to 3 inches deep. They are grown in full sunshine." In this country, to grow them to perfection they should be planted at the margin of streams or ponds, and manured as described above; or in gardens where no stream or pond exists they may be successfully grown in the following manner: barrels sawn in half, and with the bottoms knocked out, should be sunk into the ground on lawns, or in connection with the rock-garden. The bottom should be well puddled with stiff clay, on which place a foot of good loam. Then plant the Irises, and manure as they

do in Japan at intervals before spring growth commences. The soil in the tubs must be kept wet during summer.

Of all Irises the most remarkably handsome and difficult to grow are the so-called Cushion Irises, belonging to the *Oncocyclus* and *Regelia* sections. Plant the roots in December (the tops not more than 1½ inches below the surface) in a light well-drained soil, without manure, and cover with 3 or 4 inches of wheat-straw, or,

Irises, especially when seen in established masses, will fully repay the special treatment they require.

I. TALL RHIZOMATOUS OR BEARDED FLAG IRISES (fig. 52)

The flowers in this section are all large and handsome, more or less beautifully mottled in the standards and veined in the falls, while the beards range from deli-



Fig. 51—Iris Garden at Kew

better still, marsh reeds or cut heather, which remove in March. Immediately these Irises have done flowering, place over the plants a light, or panes of glass elevated 18 inches above the ground, so as to provide for a free entry of air, and at the same time to keep off rain till October. The object of this is to thoroughly ripen the roots, and prevent their starting into growth too early. The covering in winter is to keep off heavy rains, and discourage a premature growth. Or the roots may be lifted four or five weeks after they have done flowering, and stored on a dry sunny shelf or in perfectly dry sand till December, when replant. The great beauty of these

cate primrose to orange. Their beauty almost rivals that of Cattleyas. Their colours include the richest yellows, purples, blues, the softest mauves and beautiful claret-reds. There are also whites, primroses, and bronzes. The plants thrive in almost any position, but flower best in a rather dry and sunny situation, as on walls and dry banks.

The varieties are here arranged in natural groups, to facilitate selection. Each group has a distinct character. *I. germanica* flowers first, and is represented by the blue, purple, and white Flag Irises of our gardens; these bloom together, and are extremely decorative in May; following, in June, come the varieties of *I. aphylla*, *I. amœna*, *I. neglecta*,



Fig. 52.—Tall Bearded Flag Irises

I. pallida, *I. squalens*, and *I. variegata*. All are delicately fragrant.

In the descriptions S. is used to signify *Standards*, or the erect petals; F. *Falls*, or the drooping petals.

Germanica.—Common Blue Flag, Amas, Argus, Charmant, Crimson King, Kharput, Kochii, Niphotos, Oriflame, Purple King, Siwas, Una.

Aphylla.—Assyrie, Bridesmaid, Comtesse de Courcy, Madame Chereau, Sappho, Sylphide.

Amæna.—Calypso, Comte de St. Clair, Glorietta, L'Innocence, Mrs. H. Darwin, Poiteau, Thorbeck, Victorine.

Neglecta.—Albatross, Black Prince, Candelabre, Cottage Maid, Lavater, Miss Maggie, Monsignor, National, Perfection, Radiance, Virginie, Willie Barr.

Pallida.—Albert Victor, Brionense, Celeste, Dalmatica, "Princess Beatrice", Florence Wells, Her Majesty, Leonidas, Lohengrin, Mandraliscæ, Pallida, Queen of May, Ruby.

Squalens.—A. F. Barron, Dalmarius, Exquisite, Harlequin, Isoline, Jacquinianna, Lady Jane, Nibelungen, Peacock's Eye, Prosper Langier, Queen Alexandra, Rachael.

Variegata.—Aurea, Darius, Foster's Yellow, Gagus, Gracchus, Hector, Maori King, Miss Eardley, Mrs. Neubronner, Ossian, Princess Victoria Louise, Robert Burns.

II.—DWARF BEARDED FLAG IRISES

These grow 6 to 12 inches high, and flower during March, April, and May. They

succeed in almost any soil and situation, and are suitable for front groups in mixed borders, as edgings, or to mass on rockeries, also for old walls, &c.

benacensis, bright-violet.

biflora purpurea, rich purple.

" *maculata*, soft-blue, marbled purple.

Chamaeiris, deep-violet, very free.

" *alba*, S. pure-white, F. sulphur-white.

" *aurea*, deep-yellow.

" *aurea maculata*, S. yellow, F. marbled-purple.

" *italica*, purple, dwarf.

" *lutea grandiflora*, yellow.

" *sulphurea grandiflora*, sulphur-yellow.

Fieberi, violet-blue.

lutescens, pale-yellow.

" *aurea*, deep-yellow, with orange beard.

" *Statellæ*, S. white, F. primrose.

nudicaulis, S. purple, F. crimson-purple.

" *purpurea*, purple, large.

olbiensis grandiflora, rich violet-purple.

" *sulphurea grandiflora*, yellow.

Princess Ida, sulphur-yellow.

pumila bicolor, S. white, F. purple.

" *Count Andrassy*, large, blue.

" *luteo-maculata*, S. primrose, F. brown, edged yellow.

virescens major, S. sulphur, F. primrose, stained purple.

III.—JAPANESE FLAG IRISES

I. laevigata (*Kæmpferi*), *Clematis Iris*

The beauty of the Japanese Irises is superb. The flowers measure from 6 to 8 inches in diameter, with a breadth of petal 3 to 4 inches; the prevailing colours are white, red-purple, crimson, rose, lilac, lavender, French grey, purple, violet, and blue, each flower usually possessing several shades, while close under the petaloid stigma there is a brilliant yellow or orange blotch or feather, more or less conspicuous, and almost always surrounded, except in the whites, by a halo of blue or violet. Their season of blooming is from June to August.

There are many named varieties, some with double flowers.

IV. BEARDLESS RHIZOMATOUS FLAG IRISES

aurea, large golden-yellow flowers, height 4 feet.

" *Lauchæana*, large rich clear golden-yellow.

chrysographis, from Western China, flowers dark velvety purple, with a central line and flanking streaks of golden-yellow.

Delavayi, Chinese, flowers violet, height 3 feet.

ensata, soft-lilac colour, height 1 foot, early.

fœtidissima (*The Gladwyn Iris*), purple; seed-vessels prized for winter decorations, height 1½ feet.

" *fol. variegatis*, silver and green leaves.

fulva, coppery-red and orange, height 2 feet.

gracillipes, compact, with grassy leaves, and purple or lilac coloured flowers, Japan.

graminea, blue and purple, charming, height 1 foot.
 „ *latifolia*, broader foliage, height 1 foot.
Guldenstadtiana lutescens, primrose-yellow, height 2 feet.
 „ *alba*, flowers white, height 2 feet.
 „ *cærulea*, flowers blue, height 2 feet.
humilis, purple and white; short scapes, foliage 2 feet.
Japonica (fimbriata), pale-lavender with golden crest, height 1½ feet; sunny position or in cool greenhouse.
longipetala superba, porcelain-blue with golden blotch, free, height 3 feet.
Milesii, purple-blue with yellow crest, height 2 feet.

Fig. 53.—*Iris sibirica*

missouriensis, lilac with yellow spot, early, height 2 feet.
Monnieri, golden-yellow, height 3 feet; strong grower.
Monspur, large solid violet-blue flowers of great substance, may be grown either by the waterside or in the border, height 4 feet.
orientalis (ochroleuca), pure white and yellow, large, handsome.
prismatica, light-blue, spotted orange, height 2 feet.
pseudo-acorus (Water Flag), yellow, height 3 feet.
 „ *Bastardi*, primrose.
 „ *variegata*, foliage variegated in spring.
ruthenica, a miniature species, with fan-like foliage and blue flowers in July, violet-scented, height ¾ foot.
sibirica (fig. 53), elegant, narrow leaves; flowers bright-blue, height 3 feet.
 „ *atro-purpurea*, purple, very fine.
 „ *flore pleno*, deep-blue semi-double flowers.

sibirica lactea, milky-white.
 „ *orientalis (sanguinea)*, velvety-blue, very fine.
Snow Queen, petals snow-white, with golden-yellow blotch.
spuria, bright lilac-blue, height 3 feet.
 „ *variegata*, foliage golden in early summer.
stylosa, see *unguicularis*.
tectorum, Chinese, prefers a dry sunny position, height 1 foot.
 „ *alba*, a white-flowered form, height 1 foot.
tridentata (Hookeri), flowers deep-violet, height 1½ feet.
unguicularis (stylosa), light-blue, fragrant, winter-flowering, height 1 foot. Likes a sunny, dry situation.



Fig. 54.—Spanish Iris

unguicularis alba, ivory-white.
 „ *speciosa*, large flowers, dark-blue.
versicolor columnæ, velvety-purple, height 2 feet.
 „ var. *Fosteri*, pale-blue, white and yellow.
 „ *Kermesina*, claret-red, height 2 feet.
Wilsonii, leaves and habit resembling *sibirica*, but with pale yellow flowers, Western China.

V.—BULBOUS AND TUBEROUS-ROOTED IRISES¹

alata (Scorpion Iris), height 6 to 8 inches, with Leek-like leaves, and pale-blue or lilac flowers. Best grown in pots or in sheltered sunny nooks of rock garden; *alba* and *Leichtlinii* are white and dark-purple forms. Spain and Algeria.
atrofusca, S. claret-brown, veined black, F. brown-black, 3 feet.

¹ See Prof. M. Foster's *Monograph of Bulbous Irises*, published by the Royal Horticultural Society, London.

atropurpurea, coppery-maroon, with black sheen, 1 foot.

Bakeriana, similar to *reticulata*, S. sky-blue, F. white, spotted dark-violet, sweet-scented. Armenia.

Bismarckiana (*Sari nazarena*), S. sky-blue, veined purple, F. veined reddish brown-purple on a straw-coloured ground, $\frac{3}{4}$ foot.

Boissieri, rich-purple, blotch yellow, 9 inches. June.

bucharica, a fine species, flowers large, standards creamy-white, falls bright-yellow.

caucasica, primrose coloured, with silver-margined foliage, $\frac{1}{2}$ foot.

cristata, amethyst-blue, striped orange, fringed. For sunny sheltered banks, rockwork, &c., 3 inches. May.

Danfordiae, yellow, spotted brown. Dry nooks on rockwork, 3 inches. February. Asia Minor.

flavissima Bloudovii, soft-yellow, 9 to 12 inches. May.

Gatesii, large flowers of the *Susiana* type, creamy-white, tinged rose, veined and spotted silver, $2\frac{1}{2}$ feet. June.

Grant-Duffi, sulphur-yellow; may be treated like the Flag Irises.

Helene (*Marie*), large, S. bright-lilac, F. purple, veined black, velvety-black blotch.

iberica, handsome flowers, S. satiny-white, veined purple, F. brown-purple, with black blotch, 6 inches.

junceae, golden-yellow, one of the most beautiful, height 15 inches. Prefers a warm light soil.

Leichtlini, large handsome flowers, bronzy-brown to lilac, height $1\frac{1}{2}$ feet.

Lorteti, resembles *I. Gatesii*, but with rose-coloured markings, 1 foot. May.

lupina (Wolf's Fur Iris), curious greenish-yellow flowers, veined brownish-red, and with a heavy beard, resembling a wolf's fur, height $\frac{1}{2}$ foot.

lusitanica, S. and F. yellow, orange blotch, $1\frac{1}{2}$ feet.

nigricans (Black Iris), purple-black shaded maroon, inside golden-brown.

orchioides, golden-yellow, resembles *I. caucasica*, 1 foot. April.

persica, white suffused blue, blotched purple and gold, fragrant, height $\frac{1}{2}$ foot.

reticulata, deep-violet, blotched golden-yellow, violet-scented, $\frac{3}{4}$ foot. February.

reticulata, var. *Histrio*, bright-blue, blotched, golden-yellow, earlier than *I. reticulata*, $\frac{1}{2}$ foot.

reticulata, var. *histrioides*, azure, earlier and larger than *I. reticulata*.

reticulata, var. *major*, a form with broad falls and standards.

reticulata, var. *Krelagei*, purple, blotched yellow, violet-scented, $\frac{3}{4}$ foot.

Rosenbachiana, white and rosy-violet, variable, $\frac{1}{2}$ foot.

sindjarensis, white and azure-blue, crested, like *I. caucasica*, 1 foot. March.

Sisyrinchium, small soft-lavender flowers, blotched white, height $\frac{1}{2}$ foot.

Susiana, flowers large, brown, with a network of dark lines, height 1 foot. May.

syriaca, large, white, like *I. sindjarensis*.

Tingitana, dark to light blue. Falls lilac and white with golden blotch, height 2 feet. May.

tuberosa (Snakeshead Iris), velvety violet-black and green, height $\frac{3}{4}$ foot.

Vartani, azure-blue, height $\frac{1}{2}$ foot. Mid-winter.

Warleyensis, similar to *orchioides* in growth,

standards pale-blue, falls purple, with orange blotch, edged white.

xiphioides (English Iris), 2 feet high. Flowers blue or white, or parti-coloured. The following are some of the best named varieties:—Anton Mauve, Bleu Mourant, Bloudin, Cassandra, Lilacina, Madame de Beauharnais, Mont Blanc, Perdita, Proserpine, Snowflake, The Giant, Zulu.

Xiphion (vulgare) (Spanish Iris). Flowers yellow, blue, white, or bronze-coloured on stiff erect scapes. Useful for forcing in pots for cut flowers. The following are good and distinct varieties:—Alex. Von Humboldt, British Queen, King of the Blues, King of the Whites, La Reconnaissance, Leander, L'Unique, Le Plus Ultra, Souvenir, Sweet Lavender, Thunderbolt, Walter T. Ware.

Isoloma, Tydæa, and Nægelia (fig. 55).—These three genera are somewhat mixed



Fig. 55.—*Nægelia amabilis*

in gardens. They have been intercrossed, and it is difficult to determine to which genus some of the varieties belong. They all have scaly rhizomes, erect leafy stems, and tubular flowers, usually large and attractive in colour. Many of them bloom during the winter months, at which time they are particularly acceptable; they also may be grown so as to bloom during the summer. They are propagated from the scaly rhizomes, from cuttings, also from seeds.

The established plants should be started into growth early in spring, along with the Achimenes, potting them in 8- or 10-inch pots, in sandy loam, to which has

been added some sifted leaf-mould and a little sand, and placed in a temperature of 60° in the night, with a rise of 10° by day, in a light position. As the season advances give more heat; and when they come into bloom, those that flower in the summer may be removed to the conservatory, where they will continue to flower for some time. Those intended for autumn and winter flowering should be started in May, and grown on slowly in gentle heat. Towards the close of the summer when showing flower they must be kept in a temperature of from 60° to 70°, with all the light possible, and then they will go on blooming for a considerable time; manure-water should be given once a week. When at rest they may be stored with the *Achimenes*.

Kniphofia (*Tritoma*).—A genus of highly ornamental plants, consisting of about forty species, chiefly natives of South Africa, and a large number of garden hybrids. They are not exacting in their cultural requirements, a light sandy soil, plenty of water when growing, with an annual mulching of well-rotted manure, and a sunny position, affording all they need to keep them in permanent health. Coming, as they do, from a warmer country than this, most of them require a little protection in the winter, which is easily afforded by covering the crowns with a cone of cinder ashes or dry leaves.

Planted in groups on lawns, or by the side of pond or lake, they are most effective, producing their tall spikes of yellow and orange-scarlet flowers in profusion in autumn. They are also excellent plants for the mixed border. The smaller species and varieties are suitable for the rock-garden.

Those which have no stem above-ground are propagated by division in spring when new leaves are being pushed up. Those that have an arborescent stem may be made to yield stock by cutting off the head of leaves, when a large number of shoots will be produced from the base of the plant. These can be taken off as cuttings, potted in a sandy compost, and kept in a close frame for a time, where they readily take root.

K. alōides.—One of the first to be introduced into this country, and one of the parents of many fine hybrids. The best of the varieties are *maxima* (*grandis*), taller than the type, with longer heads and larger flowers. Introduced from the Orange Free State in 1862. *Var. nobilis* often attains a height of 7 feet, and has orange-red flowers. *Var. præcox*, often in flower in May.

Var. serotina, a late form with yellowish flowers. *Var. longiscapa*, a fine variety with long flower-heads.

K. breviflora.—A small plant allied to *K. modesta*. Introduced from Natal in 1895. Leaves 1 to 2 feet long, dull-green and keeled. Flower-spike 2 feet, bearing a dense raceme 3 to 4 inches long of bright-yellow flowers.

K. Burchelli.—A Cape species, with bright-green leaves 2 to 3 feet long. Flower-spikes as long as the leaves, with dense heads 3 to 4 inches long, the upper portion bright-red, the lower yellow.

K. caulescens (fig. 56).—Stem stout, a foot or more long. Leaves rather broad, 2 to 3 feet long, glaucous, keeled. Spike stout, branched; heads 4 to 8 inches long; flowers curved, an inch long, deep-red, afterwards yellow. Somewhat tender, but will stand in a well-drained sunny position in the rock garden.



Fig. 56.—*Kniphofia caulescens*

K. comosa.—Smaller than *K. alōides*, with narrow leaves in dense rosettes, erect, bright-green. Flowers drooping, in dense oblong heads, canary-yellow, with bright-red stamens. Abyssinia.

K. foliosa (*Quartiniana*).—One of the most robust. Leaves 4 inches wide, green, with rough edges. Flower-spike stout, 2 to 3 feet high, bearing a head nearly a foot long, densely packed with bright-yellow flowers tinged with red. Abyssinia.

K. Leichtlini.—Leaves wide at the base, 3 to 4

feet long, bright-green. Flower-spike 3 to 4 feet long, with heads of pendent, bell-shaped, dull-red flowers; stamens and styles slightly exerted. Introduced from Abyssinia in 1880. Var. *distachya* is a more robust form, with smaller lemon-coloured flowers.

K. longicollis (*primulina*).—Dwarfer than *K. alōides*, the leaves long, narrow, and flaccid; the flower-spike 3 feet high, bearing a raceme a foot long of bright canary-yellow flowers. Should be grown under glass, as it flowers in mid-winter.



Fig. 57.—*Kniphofia Macowani*

K. Macowani (fig. 57).—A dwarf species and a garden favourite. Suitable for the rockery. The short stem is covered with the remains of the old leaves. Flower-spikes 1 to 2 feet high, bearing dense heads, 2 to 6 inches long, of reflexed, bright orange-red and yellow flowers. A handsome hybrid between this and *K. alōides* is called *corallina*.

K. modesta.—Like *K. pallidiflora*. Leaves linear, pale-green, 2 to 3 feet long. Flower-spike slender, 2 feet high, bearing a loose cylindrical raceme of white funnel-shaped flowers 6 to 12 inches long.

K. natalensis.—A tender species from Natal which requires cool greenhouse treatment. Flower-spike 2 to 3 feet high, with loose heads of orange-red flowers, changing to a yellowish colour with age.

K. Nelsoni.—Leaves slender, 1½ foot long. Flower-spike rising above the leaves and bearing cylindrical heads of brilliant orange-scarlet deflexed flowers.

K. Northiæ.—Allied to *K. caulescens*, but with

much broader leaves, which are not keeled. Should be planted in a sunny corner, and protected in winter. Stem stout. Leaves glaucous, tapering from a 6-inch base to a long narrow point, finely serrated. Flower-spike stout, short, with dense heads of dull-yellowish flowers, the upper ones flushed with red. Found near Grahams-town, and introduced by Miss North.

K. pallidiflora.—Dwarf with white flowers, requiring a warm greenhouse.

K. pauciflora.—A small plant. Leaves few in tuft and keeled. Racemes lax, with drooping pale-yellow funnel-shaped flowers. Doubtfully hardy; should be planted against a warm wall.

K. pumila.—A handsome Cape species distinguished by its distichous leaves and short cup-shaped flowers. Flower-spike stout, bearing heads of orange-red flowers.

K. Rooperi.—Near *K. alōides*. Leaves broad, glaucous. Spike stout, with dense heads of orange-red flowers, becoming yellow with age. Produced in summer.

K. rufa.—Leaves smooth; racemes lax, 4 to 6 inches long; flowers short, exerted stamens, primrose-yellow, the upper ones tinged with red. Natal.

K. sarmentosa.—Distinguished from *K. alōides* by its smaller glaucous leaves with smooth edges and keel. Spike 2 to 4 feet, with heads of flowers which are red above and yellow below.

K. Snowdeni.—Found near the top of Mount Kenya in Central Africa. Hardy in the British Islands. Leaves long, narrow; spikes 4 to 6 feet high, flowers dull-red and yellow, loosely arranged; very distinct.

K. Tuckii.—Nearly allied to *K. pumila*, but more robust in habit. Leaves densely tufted, reflexed, 2 feet long, with a serrulate margin. Raceme 6 inches long, densely packed with deflexed sulphur-yellow flowers, tinged with red in an early stage.

The best garden hybrids are:

Express, John Benary, Goldelse, Lachesis, Lemon Queen, Nobilis Obilisque, Pfitzeri, Saundersii, Triumph, Vesuvius.

Lachenalia.—South African bulbous plants, closely related to Hyacinthus and Muscari; popularly known as Cape Hyacinths. There are about forty species, but only a few of these are worthy of consideration as garden plants. They all have egg-shaped Scilla-like bulbs, fleshy strap-shaped deciduous leaves, and elegant, more or less erect scapes of tubular flowers. Several hybrids and seedlings of garden origin also add to the value of the genus horticulturally. One of the best of these is *L. Nelsoni*.

Cultivation.—The bulbs require a season of rest after the flowering season, which extends from January to May, this rest being afforded by placing the pots of bulbs in a sunny frame or on a shelf in a greenhouse and withholding water. Early in August the bulbs should be shaken out,

sorted, and repotted in a compost consisting of loam two parts, leaf-mould one part, a small quantity of well-rotted manure or bone-dust. If to be grown in pots, 5-inch is a convenient size, planting from six to ten bulbs in each pot. The small bulbs may be planted rather thickly in pans as stock. Baskets are also suitable for *Lachenalias* (see fig. 58). The baskets, about a

may be replaced in the frame, and kept dry until repotting time in August.

Seeds are readily matured by *Lachenalias*. They should be sown as soon as ripe, when they are shining black, and they germinate freely in a temperature of about 60°. As soon as the seedlings can be handled they should be pricked out in pans or boxes, and grown on in a sunny position under



Fig. 58.—*Lachenalia tricolor* as a Basket Plant

foot in diameter, should be lined with sphagnum, and the bulbs put in as the soil is filled in. If properly planted the bulbs need not be taken out of the baskets for three or four years. After potting, they may be placed in a frame or on a greenhouse shelf, and the soil kept moist, but rather on the dry side, until the leaves are well up. During winter the ordinary greenhouse temperature, minimum 45°, suits them. Vigorous plants should be fed with liquid manure or Clay's Fertilizer, until the leaves show signs of fading. In May the pots

glass. They usually flower when three years old.

L. aurea.—The best form of this, named *gigantea*, has stout, erect spikes, 18 inches high, bearing about twenty-five flowers, each 1½ inches long, rich golden-yellow fading to a dull-purple colour; leaves 12 by 2 inches, glaucous-green with blotches of a darker shade. The type has spikes 6 inches high.

L. Cami.—Leaves 9 inches, shining green, mottled dull-brown; spike erect, a foot long, heavily blotched, and bearing from twelve to twenty flowers, ¾ inch long, orange-yellow tinged with green; buds bright-red. A seedling of garden origin.

L. glaucina.—Leaves a foot long, tapering, bright-green heavily spotted with brown; spike erect, a foot or more long, bearing numerous inflated, short yellow-green and white flowers.

L. Nelsoni.—A hybrid between *L. tricolor* and *L. aurea*, and possessed of the good qualities of both. It grows freely, produces stout, erect spikes a foot or so high of rich-yellow flowers, the buds at the top crimson.

L. orchioides.—Similar to *L. glaucina*, but the flowers are smaller and more or less blue in colour on scapes a foot long.

L. pendula.—Remarkable for its large bulbs, brittle, green, infolded leaves, and vari-coloured flowers. The scape is from 12 to 18 inches high, $\frac{1}{2}$ inch in diameter at the base, bearing a dozen or more flowers each from $1\frac{1}{2}$ to 2 inches long, coloured orange-red with purple and emerald-green tips. In some forms the flowers are mottled, in others the purple is wanting. It is quite distinct from *L. tricolor*, and is probably the *L. aureliana* of some gardens.

L. tricolor (fig. 58).—The best known and a most useful plant when properly grown. There are several colour varieties, namely *luteola*, *aurea*, *quadricolor*, and *Warei*. The type has fleshy green mottled leaves a foot long and up to 2 inches wide, a scape a foot high, bearing from twelve to twenty tubular flowers an inch long, coloured red, yellow, and green.

Lilium.—A large and varied genus widely distributed in Europe, Asia, and the southern United States. Of these three regions Asia has the greatest number of species. With the exception of a few from India, all Lilies are hardy in the United Kingdom, a late spring frost doing infinitely more damage to them when in growth than a very severe winter.

Lilies grow wild under widely different conditions; and to obtain success in the garden with them we must as far as possible imitate these conditions. Generally they may be classed as woodland plants, more especially those of North America and Japan: in the former country they are found growing in large open glades and on wooded hillsides, the undergrowth protecting them from cold winds and early frosts, and the trees during the summer screening them from the hot sun and giving that coolness and partial shade which they so much enjoy. In Japan they grow on the sides of wooded hills and slopes in pockets of rich soil washed down from the hills and generally near small streams. There is no doubt that Lilies succeed best in this country when planted in partial shade and surrounded with a cool, moist atmosphere; but they must not be planted directly under trees nor in total shade. They require some sun, but not the hot midday sun. An ideal spot for them would be an open forest glade with a small stream running

through it, near the banks of which the North American peat and moisture-loving species would flourish.

It is difficult to lay down hard-and-fast rules for the cultivation of a collection of Lilies, as the same variety may flourish equally well under totally different conditions; but a few general directions may be helpful: Positions exposed to cold sweeping winds should be avoided. Never plant directly underneath trees, but at some little distance away, so that the trees will afford some shade. A hot dry corner, or a cold, wet, heavy soil, or where the soil is water-logged are unsuitable. If planted near a large expanse of water the young growths will need protection from late spring frosts. *L. Henryi*, *L. auratum*, *L. longiflorum*, and *L. speciosum*, are specially liable to injury from this cause. In beds of Rhododendron or other low-growing shrubs they always do well, and in no position do they show up more effectively. To recapitulate, the best positions for Lilies are those that afford partial shade, protection from spring frosts and hot midday sun, with coolness and moisture at the root.

Soil.—The different soils suitable for the successful cultivation of Lilies may be divided roughly into three classes:

First, any good garden soil of a fair depth, well dug before planting, is suitable for *L. Browni*, *L. candidum*, *L. chalconicum*, *L. croceum*, *L. excelsum*, *L. Hansoni*, *L. Henryi*, *L. Martagon* (purple), *L. pyrenaicum*, *L. regale*, *L. Thunbergianum*, *L. tigrinum*, and *L. umbellatum*: these will all flourish in a good border with fair treatment.

Secondly, a rich friable loam, not too heavy, is preferred by *L. auratum*, *L. Bate-manniæ*, *L. columbianum*, *L. Humboldtii*, *L. Martagon*, *L. dalmaticum*, *L. pomponum*, *L. sutchuenense*, *L. rubescens*, *L. speciosum*, *L. Szovitzianum*, *L. Washingtonianum*, and *L. sulphureum*.

Thirdly, those that thrive in peat and moisture are *L. Burbanki*, *L. canadense*, *L. Grayi*, *L. pardalinum*, *L. Parryi*, *L. philadelphicum*, and *L. Roezlii superbum*.

All the species here named can be grown with little trouble. Those in the first list will succeed in any ordinary border under conditions inferior to those already described as essential for perfect cultivation. Those in the second list require a certain amount of partial shade, and coolness at the root, as in beds of low-growing Rhododendrons and other peat-loving low-growing shrubs.



Fig. 59.—*Lilium longiflorum* growing among Heaths



Fig. 60.—A Group of *Lilium Sargentiae*

The third group comprises those that require a cool shady spot such as the edge of a pond or stream or in a woodland glade.



Fig. 61.—*Lilium auratum*

Planting.—Autumn is the best time for planting. A Lily when in full growth is performing two functions—one developing, by means of its stem, the flowers, and the other, by means of its basal roots, the bulb for next year's growth. All Lilies have not the same root action; some make two sets of roots, one from the base of the bulb, the other from the bottom of the stem, whilst others produce roots from the base of the bulbs only. These must be well established before they can flower with any degree of success. Those that have two sets of roots may be planted almost at any time, for as soon as the stem is a few inches high roots spring from its base and help to support the stem in its development.

L. Martagon, *L. chalcedonicum*, *L. Szovitzianum*, *L. dalmaticum*, *L. Humboldtii*, and others of a similar character only produce basal roots. The root action commences about the middle of October or earlier, and continues during the winter. They should therefore be lifted before root action takes place, as if lifted later the roots get dried and the plant receives a check. There is no doubt that late planting, after root

action has been checked, is often the cause of failure.

Species with two sets of roots do not make such stout basal roots, and do not require such care when being lifted; they can be planted any time during the autumn and spring without experiencing any serious check. The stem roots of these Lilies are the main support of the flower-stem, affording it nourishment independently of the bulb. It is most important that these roots should be kept cool and moist (especially when grown in pots), for if they once get thoroughly dry the stem suffers, the leaves turn yellow, drop off, and the plant may die. This is often the cause of failure in *L. auratum*, which more than any other Lily likes coolness at the root.

Imported bulbs may be planted as late as March and April, provided they are in a fresh and sound condition. They should be placed about three times their own depth in soil that has been well dug, and it is beneficial if a little peat, turfy loam, leaf-soil, and sea or silver sand be added, placing the sand all round the bulb. It keeps moist, and prevents the attacks of slugs and worms, also preventing the soil from setting hard round the bulbs. When Lilies are planted among Rhododendrons and other shrubs, casks cut in half, with the ends knocked out are sometimes used. These are sunk in the beds and filled with good soil, and they serve to keep the roots of the shrubs and trees from interfering with the bulbs. A little well-decayed manure—

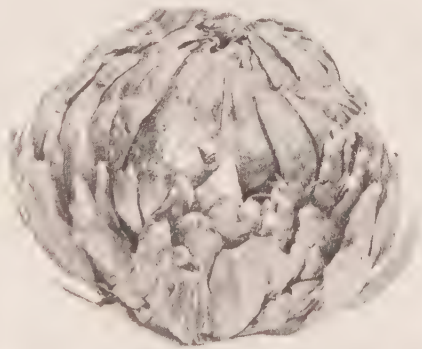


Fig. 62.—Bulb of *Lilium Nepalense*

cow-manure for preference—may be worked in beneath the bulbs when planting. The surface of the soil may be covered with ashes to a depth of 3 inches for protection in winter.

Lilies are successfully grown at Kew. The following is a brief account of the treatment they there receive. Most of the species do well in a peat mixture, but a few do better in loam, and some do equally well in either. The species which do best in peat are *L. auratum*, *L. superbum*, *L. Grayi*, *L. concolor*, *L. speciosum*, *L. canadense*, *L. pardalinum*, *L. elegans*, *L. Brownei*, *L. regale*, *L. sutchuenense*, *L. pomponium*, *L. sulphureum*, *L. Lowii*, and *L. longifolium*. They are planted in beds among Rhododendrons, Azaleas, Kalmias, Ericas, and other dwarf peat-loving evergreen shrubs,

while to collect the seeds, and then sow every year, especially of those species which flower well for a year or two and then fail. The process is simple, all that is necessary being to ensure the ripening of a few fruits on the healthiest plants, and to sow the seeds as soon as they are fit to gather in a pan or box of sandy soil placed in a frame. When the seedlings have made one leaf, prick them out in a cold frame and transplant them to the open the following year. In this way large stocks of such species as *L. Henryi*, *L. formosanum*, *L. sulphureum*, *L. nepalense*, *L. superbum*, *L. regale*, *L.*

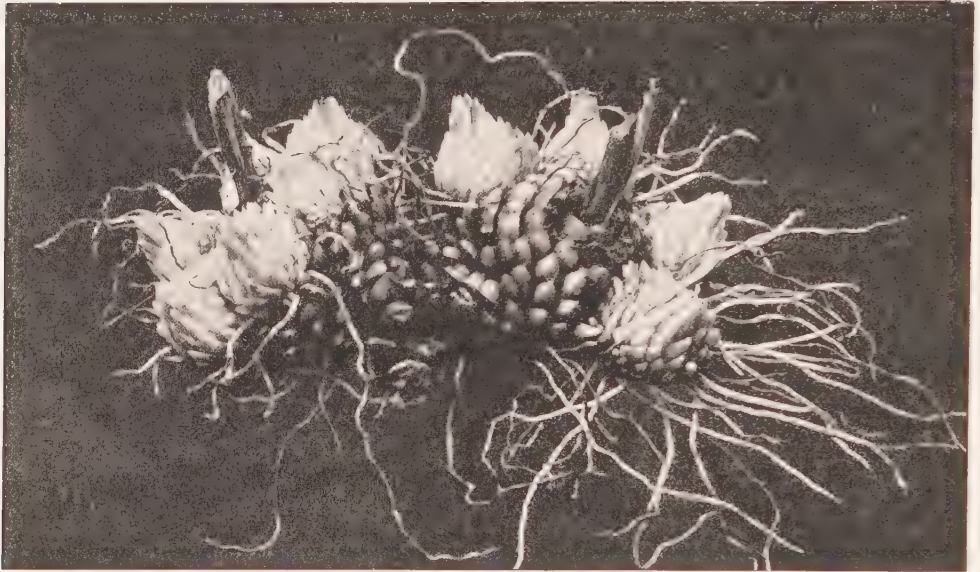


Fig. 63.—Bulb Proliferation of *Lilium pardalinum*

which not only keep the soil cool in summer, but also shelter the young growths from cold winds and frost in spring. Where possible it is usual to lift both shrubs and Lilies every three years or so, when the soil can be renovated, the shrubs respaced, and the bulbs sorted and given a fresh start.

The species which at Kew grow satisfactorily in loam are: *L. Martagon* and its varieties; *L. tigrinum*; *L. pyrenaicum*; *L. testaceum*; *L. candidum*; *L. Hansonii*; *L. chalcedonicum*, not a great success at Kew; *L. croceum*; *L. davuricum*; *L. umbellatum*, a success in any garden soil; *L. Henryi*; and *L. Szovitzianum*.

Propagation by seeds.—Many Liliiums are short-lived under cultivation, whatever may be their behaviour in a wild state. To keep up a supply of bulbs, therefore, it is worth

sutchuenense, and others have been obtained.

By scales and bulbils.—The scales of healthy bulbs, if removed and placed in pans or shallow boxes of sandy soil in a frame, will form tiny bulbs in a few months, and they will grow to flowering size in from two to three years if planted out and looked after. Some species, e.g. *L. tigrinum*, *L. sulphureum*, and *L. leucanthum*, develop axillary bulbils, which, if removed and sown in boxes or a cold frame, grow into flowering bulbs in two years. They should be lifted and sorted after the first year's growth.

L. giganteum delights in a deep rich loamy soil, in a position where it obtains protection from wind and sun. It is perhaps more specially suited for the woodland than any other Lily. Nothing is gained by

planting extra large bulbs; smaller bulbs, which establish themselves in a year or two, will throw up their lofty flower-stems in full beauty.

L. regale, *L. Sargentiae*, *L. sutchuenense* and its varieties *Thayerae* and *Willmottae* are all happy in good medium loam, with

tion, Lilies are much valued. The following varieties are suitable for this purpose: *L. auratum*, *L. speciosum*, *L. longiflorum*, *L. Hansoni*, *L. tigrinum*, *L. excelsum*, *L. umbellatum*, *L. candidum*, *L. Henryi*, *L. sulphureum*, *L. regale*, and *L. sutchuenense*.

The bulbs should be placed in pots

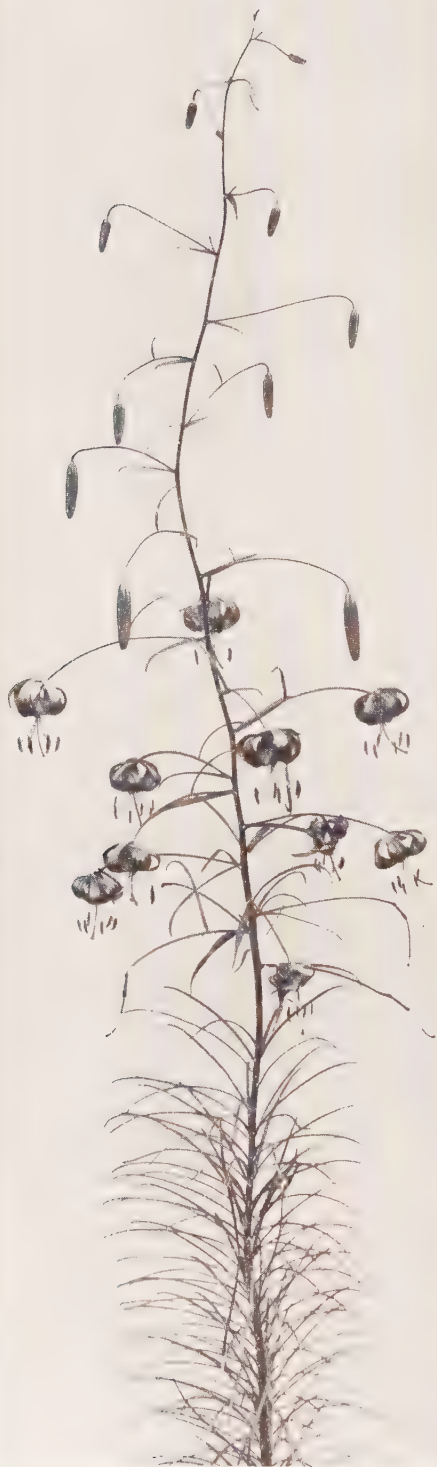


Fig. 64.—*Lilium regale*

the addition of leaf-soil and sand. *L. regale* promises to be one of the best of all Lilies. It ripens seed freely, and a large proportion of the seedlings produce flowers in two years from seed; *L. sutchuenense* also ripens seed freely, and seedlings flower when about two years old; *L. Sargentiae* grows and flowers well for two years or so and then weakens; it produces bulbils in the axils of the upper leaves, which provide a ready means of increase.

As pot-plants, for conservatory decora-

tion, Lilies are much valued. The following varieties are suitable for this purpose: *L. auratum*, *L. speciosum*, *L. longiflorum*, *L. Hansoni*, *L. tigrinum*, *L. excelsum*, *L. umbellatum*, *L. candidum*, *L. Henryi*, *L. sulphureum*, *L. regale*, and *L. sutchuenense*. The bulbs should be placed in pots about two and a half times their diameter, and 2 inches below the soil. Good turfy loam, peat, and sand form a suitable compost. Plunge the pots in ashes outside under a wall or in a cold frame, and as soon as root action has well commenced take them into the greenhouse as required. When the bulbs are well rooted care must be exercised in watering, as if once they get dry serious damage results. After flowering they should be plunged outside in a cool shady border, and when the

Fig 65 —*Lilium sutchuenense*

foliage has quite died down, stored for the winter in a cool frame or outhouse. In early spring they should be repotted or top-dressed with fresh soil.

Another method of cultivating Lilies under glass is that adopted by the late Mr. G. F. Wilson, of Weybridge, who grew them in pots in an unheated greenhouse. Protected from wind and wet the flowers are produced in a state of perfect beauty, and, if required, can be taken into the house without cutting the flower-stems. In cutting the flowers of Lilies, do not take more of the stem than is absolutely necessary, as the more stem left the better the new bulb will be.

Lilies are now an important article of commerce, hundreds of thousands reaching this country every year from Japan and Bermuda, to be forced for the market in spring and early summer, chiefly for Easter.

The species and varieties in cultivation are:

L. Alexandræ.—Flowers up to five on a stem, large, pure-white, widely expanded, of great substance. Japan.

L. auratum (fig. 61).—This magnificent Lily is so well known that it needs no description. No garden or greenhouse is complete without it. Japan.

L. auratum, var. *pictum*, a beautifully-spotted variety, with crimson-tipped petals.

L. auratum, var. *platyphyllum*.—The largest and best form. Stems stout, leaves broad; flowers 12 inches in width, richly spotted. A form called *virginale* has a golden band down the centre of each petal, which is slightly spotted with yellow.

L. auratum, var. *rubro-vittatum*, flowers large with red banded petals.

L. auratum, var. *Wittei*, flowers white unspotted with a central band of yellow, the ends of the petals in some cases tinged with reddish-brown.

L. Batemanniae.—A form of *L. elegans*. Colour rich-glowing apricot, unspotted, four to six flowers in an umbel. Japan.

L. Bolanderi.—Stems 1½ feet, flowers like *L. Grayi*, deep-crimson, with dark spots. California.

L. Browni.—One of the finest; immense trumpet-shaped flowers. Inside pure-white with brown anthers, exterior deep reddish-brown. Japan.

L. bulbiferum.—An old favourite, with bulbils in the axils of the leaves. Flowers red. Japan.

L. Burbanki.—A hybrid between *L. pardalinum* and *L. Washingtonianum*, vigorous and free-flowering; flowers orange-yellow with purple spots.

L. callosum.—Slender stems, about 2 feet high, carrying numerous pendulous orange-red flowers. Japan.

L. canadense.—Flowers varying from yellow to orange, bell-shaped, heavily spotted inside, graceful and pretty. It likes plenty of moisture. N. America.

L. canadense, var. *flavum*.—Golden-yellow, thickly spotted with purple.

L. canadense, var. *rubrum*.—Exterior red, interior yellow, spotted black.

L. candidum.—The beautiful common white Madonna Lily. Europe, &c.

L. carnolicum.—Very early, flower red, recurved like *L. chalcidonicum*. S. Europe.

L. cernuum.—Like *L. tenuifolium*, but the flowers are rose coloured and fragrant. Manchuria.

L. chalcidonicum.—The old scarlet Martagon or Turk's cap. Stems slender, each bearing from five to eight flowers. S. Europe.

L. columbianum.—Bright golden-yellow, spotted red; tall and graceful, like a small *L. Humboldtii*. N. America.

L. concolor.—Bright-scarlet, with dark-red spots; dwarf; each bulb produces several stems. China.

L. concolor, var. *coridion*.—Flowers citron-yellow.

L. cordifolium.—A dwarf form of *L. giganteum*, with white flowers. Japan.

L. croceum.—The well known orange Lily. S. Europe.

L. Dalhansoni.—A hybrid between *L. Hansoni* and *L. dalmaticum*; stems 5 feet, bearing numerous flowers of a dark-brownish purple.

L. dauricum.—Like *L. umbellatum*; flowers three to six in an umbel, yellow flushed with red, black spotted. Dahuria.

L. Duchartrei.—Stem 3 feet, flowers in a terminal head, white, rose tinted outside and spotted inside. *L. Farreri* is said to be a variety of it. China.

L. elegans (*Thunbergianum*).—A dwarf early-flowering Lily. Stems from 1 to 2 feet high, producing upright cup-shaped flowers of large size and brilliant colour. For planting in groups amongst low-growing shrubs, or as pot-plants for the conservatory it is invaluable. Strong bulbs produce three or four stems carrying from three to five flowers on each. Japan.

L. elegans, var. *Alice Wilson*.—Clear lemon-yellow.

L. elegans, var. *atrosanguineum*.—Stem bearing five or six large, deep-red, black-spotted flowers.

L. elegans, var. *aurantiacum verum*.—Citron-yellow.

L. elegans, var. *bicolor*.—Orange-red, splashed with yellow.

L. elegans, var. *brevisifolium*.—Orange-red, early.

L. elegans, var. *flore pleno*.—Deep-red, semi-double.

L. elegans, var. *Horsmani*.—Rich-crimson.

L. elegans, var. *marmoratum aureum*.—Orange-yellow with crimson spots, early.

L. elegans, var. *Orange Queen*.—Stems a foot high, bearing one to three flowers, bright-orange with dark spots.

L. elegans, var. *ornatum*.—Early, flowers large, well-shaped, bright orange-yellow spotted black.

L. elegans, var. *Prince of Orange*.—Apricot-yellow.

L. elegans, var. *Van Houttei*.—Crimson; one of the finest.

L. elegans, var. *venustum*.—Late, clear orange-yellow.

L. elegans, var. *venustum macranthum*, bright clear-orange, large flower.

L. elegans, var. *Wiltoni*.—Two feet high, large erect flowers, apricot colour, purple-spotted, streaked with yellow.

L. giganteum.—A noble Himalayan Lily, which, when well established, grows 10 feet high, bearing

numerous long tubular white flowers, streaked outside with crimson; large handsome foliage.

L. Grayi.—Allied to *canadense*; flowers bell-shaped, dark rich red, spotted purple. N. America.

L. Hansoni.—Stems 4 feet high, bearing numerous massive flowers of a rich golden-yellow, heavily spotted black; very early. Japan.

L. Henryi.—Stems 6 feet or more in height, bearing over twenty flowers, which are rich-yellow, the foliage glossy-green. China.

L. Humboldtii.—Tall; producing when well



Fig. 66.—*Lilium Martagon*—var. *dalmaticum* (purple)

established twenty to thirty flowers on a stem, coloured golden-yellow, spotted with purple. California.

L. Humboldtii, var. *Bloomerianum*.—Golden-yellow, tips of petals stained purple, large spots.

L. Humboldtii, var. *magnificum*.—Rich-yellow, heavily spotted.

L. japonicum Colchesteri (*odorum*).—Often confused with *L. Browni*, from which it is quite distinct; flowers large, trumpet-shaped, when first open pale-yellow, fading to a creamy-white; the outside is streaked irregularly with reddish-brown; deliciously fragrant. Japan.

L. Krameri.—A beautiful pink Lily, quite unique in colour. A form of it bears six or more flowers on a stem, somewhat in the way of *L. Batemanniae*. Japan.

L. Leichtlini (*Maximowiczii*).—Very beautiful

Fig. 67.—*Lilium Nepalense*

and graceful; citron-yellow, thickly spotted purple. Japan.

L. longiflorum (fig. 59).—Stems 2 or 3 feet high, carrying six to ten flowers of great substance and purity, lasting a long time when cut. China and Japan.

L. longiflorum, var. *Harrisii*, the Bermuda Lily.—Bulbs, 10 to 12 inches in circumference; producing several spikes of very large flowers.

L. longiflorum, var. *takesima grandiflorum*.—Distinct, with stiff foliage, and dark-brown stems, bearing from six to ten long white tubular flowers, tinged with brown externally.

L. longiflorum, var. *Wilsoni*.—Flowers 8 to 10 inches in length and 4 to 6 inches across, with broad dark-green foliage.

L. Lowii.—Stems 2 to 3 feet high, bearing from two to five bell-shaped white flowers, spotted with dull-crimson; the markings vary. Burma.

L. Marhan.—A hybrid between *L. Martagon album* and *L. Hansonii*; stems 5 to 7 feet, free-flowering; petals thick, orange, with red-brown streaks.

L. Martagon.—Strong-growing, producing twenty to thirty light-spotted purple flowers. S. Europe.

L. Martagon, var. *album* (White Martagon).—One of the best Lilies, stems 4 to 5 feet high, carrying twenty to thirty pure wax-white flowers.

L. Martagon, var. *dalmaticum* (fig. 66).—Stems 5 to 6 feet high, producing from twelve to twenty-five flowers, varying in colour from light- to dark-purple; quite distinct. *Catani* is a form with very dark crimson flowers.

L. neilgherrense.—Pale sulphur-yellow, very fragrant, late; requires greenhouse culture. India.

L. Nepalense (fig. 67).—Flowers funnel-shaped, golden-yellow, deep-purple inside at the base, and

often marked with scattered dots. Burma and China.

L. pardalinum (fig. 68).—Stems 4 to 7 feet high, bearing twelve to thirty flowers, colour bright-orange, spotted with dark-crimson. California.

L. pardalinum, var. *californicum*.—Stem slender, 3 to 4 feet high; flower deep-orange, spotted maroon; tips of petals bright-scarlet.

L. Parryi.—A beautiful Lily with citron-yellow fragrant flowers, spotted with chocolate-brown; it likes peat and moisture. California.

L. parvum.—A graceful Lily, stems 5 feet, bearing numerous well-shaped canary-yellow flowers, shading to red. California.

L. philadelphicum.—Stem bearing two to five flowers, cup-shaped, base of petal yellow, maroon-spotted, tips of petals bright-scarlet. N. America.

L. philippinense.—Flowers large pure-white, similar to *L. longiflorum*, deliciously scented, the foliage narrow and long; greenhouse. Philippines.

L. pomponium.—Bright-scarlet, graceful, slender foliage, in the way of *L. chalcidonicum*. Siberia.

L. primulinum.—A tall handsome Lily with large trumpet-shaped, pale-yellow flowers. It requires greenhouse treatment. Burma.

Fig. 68.—*Lilium pardalinum*

L. pulchellum.—Allied to *L. concolor*, bearing upright crimson flowers, spotted black. Dahuria.

L. pyrenaicum.—Early, yellow flowers, heavily spotted black, strong scent. Pyrenees.

L. regale (fig. 64).—Stem 2 to 3 feet, sturdy, leafy, bearing an umbel of from three to ten large trumpet-shaped flowers, wine-red outside, white inside, yellow in the throat, very fragrant, forces well. A superb garden lily. China.

L. Roeslii.—Stems 2 to 3 feet with scattered linear foliage, the flowers arranged in a raceme some five to ten in number, orange-red, purple-spotted. N. America.

L. rubellum.—Stems 1 to 2 feet high, bearing one to four elegant rosy-pink bell-shaped flowers with yellow anthers. Japan.

L. speciosum, var. *punctatum*.—White, spotted and shaded pink.

L. speciosum, var. *roseum*.—White, spotted rose.

L. speciosum, var. *roseum formosum*.—Distinct, the whole flower being of a lovely soft-rose shade; foliage and stem light-green.

L. speciosum, var. *roseum superbum*.—Like *Melpomene*, but with green stem; flowers large, of great substance and perfect shape.

L. speciosum, var. *rubrum*.—White, spotted crimson.

L. sulphureum (*Wallichianum superbum*) (fig. 69).—A grand Lily; stem up to 10 feet high with very large tubular flowers, cream-yellow inside, tinted rosy-brown outside. Easily cultivated, produces small bulbs at the base of the leaves as in *L.*



Fig. 69.—*Lilium sulphureum*

L. Sargentiae (fig. 60).—One of the *Brownii* group, a sturdy grower; flowers white, tinged outside with purple.

L. speciosum.—One of the most popular, succeeding either in the open border or in pots, producing quantities of flowers, lasting well into the autumn, when nearly all other Lilies are over. Japan.

L. speciosum, var. *album*.—Pure-white, exterior red.

L. speciosum, var. *album Kraetzeri*.—Pure-white.

L. speciosum, var. *album novum*.—Flowers large, white, anthers golden-yellow.

L. speciosum, var. *compactum*.—Buds and flowers very highly-coloured externally, foliage dark-green.

L. speciosum, var. *cruentum*.—Highly coloured, late.

L. speciosum, var. *macranthum*.—Large, deep-rose.

L. speciosum, var. *Melpomene*.—Strong and free, crimson-purple, heavily spotted and margined white.

tigrinum. Does well in pots. Requires a sheltered position outside.

L. superbum.—Stem 6 to 7 feet high, producing twelve to thirty bright orange-crimson, recurved, heavily spotted flowers; prefers a moist situation. N. America.

L. sutchuenense (fig. 65).—Stem from 1½ to 4 feet, clothed with narrow dark-green leaves; flowers in a loose terminal panicle, rich orange-scarlet with dark spots nodding, the petals recurved. China. There are several varieties of it, a distinct beautiful Lily.

L. Szovitzianum (*colchicum*).—Stem frequently attains a height of 5 feet, with as many as thirty flowers. Flowers rich citron, spotted with black, anthers chocolate-brown; the flowers are large, and are arranged like so many pendulous bells. One of the earliest. Caucasus.

L. tenuifolium.—Graceful slender stems, bearing many bright-scarlet flowers; early. Dahuria.

L. testaceum (*excelsum*).—A stately Lily, 4 to 5 feet high, bearing six to twelve flowers of a beautiful nankeen-yellow shade; one of the best. A hybrid.

L. tigrinum.—The fine old Tiger Lily. Japan.
L. tigrinum, var. *flore pleno*.—The double Tiger Lily.

L. tigrinum, var. *Fortunei giganteum*.—Pyramidal spikes 6 feet high, carrying in many cases fifty flowers of grand colour.

L. tigrinum, var. *splendens*.—Large flowers, with large spots, highly coloured.

L. umbellatum.—An early free-flowering species, with tall stems and large heads of orange-red flowers, very free, easily grown. Dahuria.

L. umbellatum, var. *erectum*.—Red, flushed orange.

L. umbellatum, var. *grandiflorum*.—Orange-red.

L. umbellatum, var. *incomparabile*.—Scarlet, very fine.

L. umbellatum, var. *Sappho*.—Light-orange, flushed red.

The following are said to be the result of crossing *L. umbellatum* with *L. Thunbergianum*:—*Aurantiacum*, bright-orange, flushed with red; *Cloth of Gold*, strong spike, light golden-yellow; *Pictum*, in the way of *elegans bicolor*; *Sensation*, a splendid large flower.

L. Wallacei.—A late-flowering Lily, each bulb produces three to five stems of rosy apricot-tinted flowers, thickly spotted. Valuable as a pot-plant; likes moisture.

L. Washingtonianum.—Stem tall, producing long panicles of flowers, which have widely-expanded petals, white, shading off to lilac, fragrant. California.

L. Washingtonianum, var. *purpureum (rubescens)*.—Flowers opening white, changing to a delicate purple.

Montbretia (fig. 70).—Among the many beautiful bright-flowered genera of bulbous plants introduced from South Africa Montbretia is conspicuous. From it have originated, principally through the efforts of M. Lemoine of Nancy, a race of seedlings which, for brilliant colouring and free-flowering propensities, ranks high among hardy bulbous plants. More recently Mr. S. Morris and Mr. G. Davison, both of Norwich, have raised numerous superior seedlings.

Where they grow well, and are left in the ground from year to year, they should be lifted every third year, or they get so overcrowded that they do not flower freely. If lifted in the autumn, the corms are best kept dry until spring, when they can be replanted outside. Choice sorts should be started in pots in a cold frame about the end of February and planted out in their flowering quarters in May. Another method is to lift the bulbs in autumn, with the stolons attached, pack them closely in boxes, covering them with soil and keeping them dry and safe from frost in a cold frame. When they have made some growth, about the end of February, pull the bulbs and stolons apart, plant them in pans and place them in a cold frame till May, when they should be ready for planting out.

Selection of Varieties

Citronella, George Davison, Hereward, His Majesty, King Edmund, Koh-i-noor, Lord Nelson, Pluie d'Or, Prometheus, Queen Alexandra, Queen Boadicea, Queen Charlotte, Queen Elizabeth, Queen Mary, Rayon d'Or, Star of the East, Toison d'Or, Westwick.



Fig. 70.—Montbretia—Queen Adelaide

Narcissus.—A well-defined genus of hardy bulbous plants, mostly natives of western Europe, and much cultivated and improved during recent years. The best and freest-flowering kinds are so extensively grown as to have become of considerable economic importance, both bulbs and cut blooms being very remunerative to market-gardeners, florists, and others.

Their flowers are solitary, or clustered several together on their fluted stalks, and are in the main yellow or white in colour; but some of the more recent seedlings and hybrids have red-orange or fiery-tinted cups or "crowns", which add much to their decorative value.

About twenty distinct species are now recognized, and the number of hardy, free-growing and free-blooming seedling sports and hybrids is now very great. The species of *Narcissus* which lend themselves to ordinary open-air or garden cultivation



Fig. 71.—Daffodils in Grass at Kew



Fig. 72.—Field Cultivation of Poet's Narcissus

are *N. Pseudo-Narcissus*, *N. poeticus*, *N. Tazetta*, *N. Jonquilla*; and in a lesser degree, *N. triandrus* and *N. Bulbocodium*. By crossing the Daffodil with the purple-ringed Narcissus (*N. poeticus*), we obtain all sorts of star Narcissi, viz. *N. incomparabilis*, *N. Barrii*, *N. Burbidgei*, &c.

Again, the Daffodil and *N. Tazetta* give the varieties named *N. tridymus*; and the Daffodil and *N. Jonquilla*, all the forms of the so-called *N. odorus*.

Cultivation.—Most of the garden varieties are of easy culture, growing well in any good garden soil, in beds, borders, or on outlying parts of the lawn or pleasure-grounds, where the grass is not cut until their leaves have faded in June.

The best, hardiest, and most decorative of Daffodils are *N. Pseudo-Narcissus*, *N. poeticus*, and the numerous hybrids between them which are known under the name of *N. incomparabilis*. Good, deep loamy soils suit all those varieties, and they also do well on deep, sandy or gravelly soils. The main point is to dig the ground well at or before planting-time, and on no account to use any crude stable, farmyard, or other manures. If the land is impoverished, and manure essential, then deep culture and heavy manuring should be followed by a crop of early Peas, Potatoes, or other similar produce, after which the soil can be again well worked, and the Narcissus bulbs planted. This method is followed by most of those who grow Narcissus bulbs and cut-flowers for market. Top-dressings may be applied to plots or beds of Narcissus with advantage in the spring as soon as the leaves appear. A good dressing is that composed of bone-dust and wood-ashes, mixed with five times their bulk of fine or sifted soil. Basic slag has been used with good effect, as also sulphate of potash mixed with five times its bulk of finely sifted soil.

June, July, and early in August are the right months for digging and replanting, and it is always best to dig the bulbs when the leaves turn yellow; dig too early rather than too late, and in all cases before the young roots appear from the base of the bulbs. This is important as they commence to make new roots as soon as the foliage has died down. Bulbs may be dried in a cool and airy shed, and should not be exposed to the sun in the open for any length of time.

Trade growers lift their stock every year, selecting the largest from the stock bulbs,

and then replanting them in separate plots; but in private gardens annual digging and replanting is not really necessary, except for bedding or flower-garden displays. On ordinary borders the strong-growing kinds may be allowed to remain from two to five years undisturbed with advantage, after which time the bulbs become too crowded, the soil exhausted, and the blooms perhaps sparse and small. Delicate varieties are best treated by lifting and replanting in fresh soil every year in June or July. Now and then *N. poeticus* varieties, single and double, turn blind, i.e. produce scapes but not flowers, and the remedy is to replant every year.

Bulbs may be planted from 3 to 7 inches deep; the drier and lighter and warmer the soil, the deeper the bulbs may be covered. Large-growing kinds may be placed 6 inches apart, and smaller or weaker bulbs nearer, say 3 inches or less.

Narcissi are readily increased by side bulbs or offsets, which are taken off at planting time; but if new varieties are desired, then careful cross-pollination is necessary, and the seed saved and sown as soon as ripe in well-drained boxes of sandy soil, and placed in a cold frame. Sown in July or August, the seedlings appear the following spring; they must be transplanted when dormant, and then grown on for from three to five or six years before they are strong enough to flower. Seed of the strong-growing kinds may be sown on a layer of good soil spread in a cold frame, or even in open-air seed-beds in mild localities. Seed of small species and their hybrids may be sown in boxes or pots, in a greenhouse, or slightly heated pit or frame.

Pot Culture (fig. 73).—All the Daffodils, Poets, and *Incomparabilis* varieties are very useful when grown in pots for early-spring flowering.

Also the forms of *N. Tazetta*, beginning with Paper White and Double Roman, which may flower at Christmas in the greenhouse, being succeeded by Grand Monarque, Soleil d'Or, Scilly White, and many others.

Pot up the bulbs in July or August, three to five in a pot, and plunge the pots in a half-shady yard or border until they are filled with roots. If wanted to bloom early, they must be sheltered in pit or frame slightly heated in frosty weather, removing them to greenhouse or conservatory through the forcing-house or pit as they may be required, always remembering that, like Hyacinths and Tulips, the less fire-heat they receive the stronger they will bloom.

Any good fresh loamy soil suits the strong growers, using more sand for the more delicate.

When large quantities are forced for cut-bloom, the bulbs may be packed nearly close together in shallow boxes, and forced on as required. In addition to the strong, decorative Daffodils, there are some choice species and varieties that are never seen to better advantage than when grown in pots and sheltered in the greenhouse or

and the result is larger and cleaner flowers than if they had been left to open before cutting. If required to send away, the buds may be packed in shallow boxes after having been an hour or so in water, and thus many more can be sent, and they carry better than if sent fully open. On arrival, place the stalks in tepid fresh water, and they will open fresh and fair, and show but slight traces of the longest journey.

Water Culture.—All the varieties of *N.*



Fig. 73.—Narcissus, Queen of Spain, grown as a Pot Plant

conservatory. Of such are the forms of the Hoop Petticoat Daffodils (*N. Bulbocodium*), White, Sulphur, and Golden-yellow. *N. Jonquilla*, or true Jonquil, one of the most distinct and the sweetest of all, is never so beautiful as when grown in pots. *N. triandrus* and its hybrids are exquisite under pot culture, as also are *N. juncifolius*, *N. rupicola*, *N. minimus*, and *N. cyclamineus*.

Gathering the Flowers.—Narcissus flowers should be cut just as the perianth lobes expand at their tips, placing them in water in a light shed or greenhouse, at a temperature of 65° or 70°; they rapidly expand,

Tazetta, and even the larger Daffodils, may be grown in water-glasses like Hyacinths, or in bowls of water and sand or stones (fig. 74). They may also be grown in pots or vases of moss, coco-nut fibre, or in Jadoo for special purposes.

In China, and in the Chinese quarters in America and California, the water culture of the Sacred Narcissus, or Joss Lily, has long been popular, the bulbs being specially grown in China for the purpose. The Joss Lily is simply an eastern variety of *N. Tazetta*, white, with a yellow crown. The bulbs are large with several offsets attached, and these blossom as well as the main bulb.

Placed in bowls of water and stones, and set in the sunny window of a warm room, the leaves and scapes grow 16 inches high, and develop their flowers in about six weeks.

Narcissus for the Wild Garden (fig. 71).—All the strongest sorts, and even some of those reputed delicate and uncertain in cultivated beds or on borders, thrive and bloom vigorously in meadow or lawn in the grass. The best are the Daffodils, *N. poeticus* and *N. incomparabilis*, and in most good gardens the natural increase of stock will supply the necessary bulbs for this



Fig. 74.—Daffodils grown in Dish of Water

beautiful feature of spring gardening. The main point in planting bulbs among grass is to do it as naturally as possible. If one looks at the wild Lent Lily in a Kentish orchard or meadow, it groups itself without a trace of formality. There may be dots on the fringe of denser groups, but there are no lines, half-moons, nor circles. In planting, lead the large groups into each other, and see that each group or colony has a focus spot, i.e. one group or mass of bulbs of greater importance than the rest. An irregular cloud-like effect is the most effective, strong at one point, and shading gradually away from that to the margin. In nature we do not see bulbs or other plants in forest or field equally distributed.

SPECIES AND HYBRIDS OF NARCISSUS

GROUP I.—MAGNICORONATI

Large-cupped or Trumpet Daffodils. Crown as long, or longer, than the perianth divisions

(a) Flat-leaved

N. cyclamineus.—A small species from Oporto, with bright-green flat leaves and golden flowers, the perianth lobes turned back as in Cyclamen. Portugal.

N. Pseudo-Narcissus (Common Daffodil or Lent Lily).—Of this there are many forms, ranging from *N. minimus*, 3 or 4 inches high, to *N. maximus*, which varies from 2 to 3 feet, all having flat glaucous or grey-green leaves. Britain and throughout North and North-western Europe.

(b) Rush-leaved

N. Bulbocodium (Hoop Petticoat) (fig. 75).—Leaves thick and bright-green. Flowers white, sulphur or deep yellow. Perianth lobes narrow and pointed; corona large and funnel-shaped. There are five or six distinct varieties, *N. Bulbocodium*, var. *conspicuus*, being one of the best and most showy. Var. *monophyllus* has pure-white flowers. It does well as a pot-plant. Spain, South-west France, North Africa.

GROUP II.—MEDIOCORONATI

Crown half, or rarely three-quarters, as long as the perianth divisions

(a) Flat-leaved

N. dubius.—Scapes two- to nine-flowered. Flowers similar to those of *N. juncifolius*, but all white. Leaves flat, slender, glaucous. Not a showy kind. South France—Toulon, Avignon, Nice, &c.

N. incomparabilis.—Flowers solitary on tall scapes, 2 to 4½ inches across, white, yellow, or bicoloured, the expanded cups often rich-red or orange. One of the most variable of hybrids, found wild, and much grown in gardens. *N. Barrii*, *N. Leedsii*, *N. Burbidgei*, and the wild *N. Bernardi* are examples. Spain, South-west France, Tyrol.

N. Macleayi.—An old garden hybrid between the Daffodil and *N. Tazetta*, a foot high. Leaves greenish. Perianth white, cup straight and yellow. One to two flowers on each scape. *N. Sabini* is another old hybrid in this group with larger flowers. *N. Backhousei* and *N. Nelsoni* belong to this group.

N. montanus.—A probable wild hybrid of the Pyrenees between *N. poeticus* and *N. moschatus*. Flowers all white, smaller, and more nodding than in *N. incomparabilis*. One of the parents of the pure-white form called *N. Leedsii*, and its varieties. ?Pyrenees.

(b) Rush-leaved

N. juncifolius (Jonquil).—Leaves bright-green and rush-like. Scapes one- to five-flowered, with a flattened corona. Very sweet-scented. Spain and South-west France.

N. odoratus (Campernelle Jonquil).—A hybrid



Fig. 75.—Hoop Petticoat Narcissus

wild in South France and Spain, and also raised in gardens between the Daffodil and the Jonquil. Flowers all golden-yellow, two to five on a scape; having bright-green rush-like leaves. There are four or five single and one double variety. Spain, South-west France, Italy.

N. triandrus (Angels' Tears) (fig. 76).—Leaves broad, pale-green, and rush-like. Scapes one-

to nine-flowered. Perianth divisions abruptly reflexed. Hybridized with the Daffodil, it gives a race of exquisite pale, drooping flowers. Has also formed hybrids with *N. Bulbocodium monophyllum*, such as *N. Trimon*, and others. Spain and Portugal. *N. calathinus* is the largest and finest form of *N. triandrus*, found wild in L'Iles de Glenan, off the coast of Brittany.

Fig. 76.—*Narcissus triandrus albus* ("Angels' Tears")

GROUP III.—PARVICORONATI

Crown less than half as long as the perianth divisions

(a) Flat-leaved

N. biflorus.—Wild near Montpellier, where *N. Tazetta* and *N. poeticus* grow together, and known to be a hybrid though long considered a species. Naturalized in England and Ireland. Grows anywhere in meadows, but is not a good garden plant. France, Switzerland, Italy.

N. Broussonetii.—Flowers many on a scape, white, funnel-shaped, with the crown nearly suppressed, and the habit of *N. Tazetta*. Not a good garden plant. Mogadore, North America.

N. canariensis.—A slender-habited form of *N. Tazetta* from the Canary Islands.

N. pachybulbus.—Habit and appearance of *N. Tazetta*, of which it seems to be an African form. Algeria.

N. poeticus (Pheasant's Eye).—A very variable and widely-distributed European species. Flowers solitary, pure white, the shallow crown having a red or purple ring around its margin. Sweet-scented; one of the hardiest, most useful, and distinct of all garden Narcissi. Mr. Engleheart's seedlings of it are very handsome. South Europe, France to Greece.

N. Tazetta.—One of the most variable and widely-distributed species of the genus, extending from Europe and North Africa in the Mediterranean to North India, China, and Japan. Bulbs often very large. Leaves glaucous. Scapes two- to fifteen-flowered. Flowers white, sulphur, deep-yellow, or bicoloured, and sweet-scented. Much grown and improved by seed in Holland a century or more ago. Has been hybridized with the Daffodil (= *N. tridymus*, *N. Sabini*, &c.), with *N. poeticus* (= *N. orientalis*, *N. gloriosus*, and *N. Bazelman major*). South Europe, Cashmere, North India, China, and Japan. This is undoubtedly the true poet's Narcissus of Greece, Italy, &c.

(b) Rush-leaved

N. gracilis.—This and *N. tenuior* are hybrids between *N. juncifolius* and the Daffodil; they bear soft yellow flowers similar in shape to those of *N. poeticus*—very late-flowering kinds.

N. intermedius.—A hybrid between *N. Jonquilla* and *N. Tazetta*. Not very showy or distinct, simply a rush-leaved *N. Tazetta*. Spain, South France, Balearic Islands, &c.

N. Jonquilla.—Flowers slender and star-like, golden-yellow, two to seven on a scape, sweet-scented; with bright-green rush-like leaves. *N. jonquilloides* is a large form, probably a seedling between *N. Jonquilla* and a yellow-flowered *N. Tazetta*. Spain, South France, Italy, to Dalmatia.

(c) Autumn-flowering Species

N. elegans.—Plant small. Scape one- to three-flowered, at same time as the leaves. Flowers pure-white. Not showy nor easily grown. Italy, Sicily, Algiers.

N. serotinus.—Similar to the last, but with larger flowers and broader segments. Blooms after the leaves have withered. Not a good garden plant. Spain, South Europe, Barbary States, Greece, and Palestine.

N. viridiflorus.—A slender plant with rush-like

leaves and scapes. Flowers star-like, pale-green, two to seven on each stalk. Spain and Barbary.

Best Garden Varieties.—The newest and best of seedling Narcissi can only be obtained at high prices, and many of those exhibited and certificated cannot for a time be purchased at any price. Fortunately, however, they increase rapidly, so that in a few years they become plentiful. Many of the older kinds can be bought cheap by the hundred or thousand.

The true Daffodils are those with golden bicoloured and sulphur or white flowers. As a rule, the golden and bicolour varieties grow well in almost any soil, but the pale sulphur-and-white kinds often fail on open sunny borders, doing better in half-shade or in the grass.



Fig. 77.—Daffodil—Glory of Leiden

YELLOW TRUMPET DAFFODILS

Alma.—Seedling from *K. maximus*, canary-yellow trumpet.

Cleopatra.—Broad yellow imbricated perianth.

Emperor.—Perianth Primrose, trumpet yellow.

Glory of Leiden (fig. 77).—Perianth pale-yellow, with deeper markings.

Golden Spur.—Deep rich self-yellow, fine for forcing.

Henry Irving.—Large spreading perianth, yellow trumpet, excellent for forcing.

King Alfred (fig. 78).—Very large bold flower, colour a uniform golden-yellow.

Lord Roberts.—Flowers very large, golden-yellow, strong grower.

Maximus.—Fine deep golden-yellow, with twisted perianth.

Minimus.—The smallest trumpet Daffodil, only about 3 inches high, a gem for the rock garden.

Minor.—Small, golden-yellow, 6 inches high, fine for rock garden.

Monarch.—Perianth and trumpet golden-yellow.

Obvallaris (Tenby Daffodil).—Very early, about 12 inches high, fine for pots and naturalizing in grass.

P. R. Barr.—Perianth primrose, trumpet rich full yellow.

Rev. D. R. Williamson.—Clear yellow, long handsome trumpet.

Santa Maria.—Rich deep golden-yellow, perianth elegantly twisted, early.

Van Waveren's Giant.—Very large, perianth primrose, trumpet yellow, with large open mouth.

WHITE TRUMPET DAFFODILS

Albicans.—White perianth, cream-coloured trumpet.

Alice Knights.—The earliest White Trumpet, trumpet creamy-white, pretty frilled open mouth.

Cernuus.—Perianth and trumpet silvery-white.

Henri Vilmorin.—A beautiful White Trumpet Daffodil.

Madame de Graff.—A favourite variety, perianth ivory-white, trumpet primrose, passing to white.

Moschatus (of Haworth) (the snowy-white Daffodil of Spain).—Best naturalized in grass in partial shade, on slopes facing north.

Mrs. G. H. Barr.—Perianth and trumpet snowy-white.

Mrs. H. D. Betteridge.—A beautiful snowy-white flower, trumpet with flanged and fluted brim.

Mrs. Robert Sydenham.—Trumpet and perianth white.

Pallidus præcox.—A native of the Pyrenees, pale-straw colour to creamy-white, very early.

Peter Barr.—Large flowers of fine form, perianth pure-white, trumpet ivory-white.

Philippe de Vilmorin.—White perianth, cream-coloured trumpet, fine bluish-green foliage.

W. P. Milner.—A free flowering variety, dainty sulphur-coloured flowers, fine for the rock garden or small pots, less than a foot high.

BICOLOR TRUMPET DAFFODILS

Apricot.—Perianth white, trumpet primrose, passing to a rosy apricot buff.

Cygnets.—Perianth white, trumpet lemon-yellow.

Duke of Bedford.—Very large flower, white perianth, trumpet clear soft-yellow.

Empress.—White perianth, trumpet rich yellow, foliage blue-green, good for all purposes.

Glory of Noordwijk.—Large flower, creamy-white perianth, bright-yellow trumpet.

Grandis.—Pure-white perianth, yellow trumpet of great substance, late flowering.

Horsfieldii.—A favourite and useful variety, white perianth, yellow trumpet.

J. B. Camm.—Perianth white, trumpet rich deep-cream, a good bedding variety.

Madame Plomp.—White twisted perianth, long golden-yellow trumpet.

Princeps.—Perianth sulphur-white, trumpet yellow, fine for naturalizing.

Victoria.—Perianth creamy-white, yellow trumpet, a useful variety.

Weardale Perfection.—Very large flowers, perianth white, soft-primrose trumpet.

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William Goldring.—Perianth snow-white, primrose trumpet, drooping flower: appropriately called the "Swan's Neck Daffodil".

INCOMPARABILIS, CHALICE-CUPPED DAFFODILS

Varieties of *Bernardi* and *Nelsoni*, also the large-flowered varieties of *Engleheartii*, are included in this division.

Bedouin.—White perianth, cup fiery orange-scarlet.

Bernardino.—Creamy perianth, cup pale, fluted and stained deep orange-apricot.



Fig. 78.—A Market Bunch of Trumpet Daffodils (King Alfred)

Blackwell.—Perianth primrose-yellow, cup yellow, stained fiery orange-scarlet.

Blazing Star.—Perianth yellow, cup yellow with red margin.

J. C. Backhouse.—Perianth yellow, long orange-red cup.

Constellation.—Large white perianth, cup yellow, margined orange.

Fireflame.—Perianth yellow, cup orange-scarlet.

Frank Miles.—Flowers soft clear-yellow, fine for naturalizing.

Gloria Mundi.—Clear-yellow perianth, large open crown, stained rich orange-scarlet.

Great Warley.—Perianth white, cup clear-yellow.

Gwyther.—Yellow perianth, large orange cup.

Homespun.—Light-yellow perianth, rich yellow frilled crown.

Lady Margaret Boscawen.—Perianth snowy-white, golden-yellow crown.

Lucifer.—Perianth white, cup intense glowing orange-red.

Sir Watkin.—Perianth primrose, cup yellow, tinted orange, good for all purposes.

Stella superba.—Clear-white perianth, yellow cup, fine for naturalizing and cutting.

Whitewell.—Creamy-white perianth, large chrome-orange crown.

Will Scarlett.—Perianth creamy, large fiery orange cup, elegantly crimped.

Oriflame.—Perianth creamy-white, cup fiery scarlet.

Red Chief.—Pure-white perianth, fringed crown, with broad margin of orange-red.

Rosalind.—Perianth white, cup yellow, edged scarlet.

Royal Star.—Cream perianth, crown large and flat, brilliant orange shaded yellow.

Seagull (fig. 80).—Perianth white, cup canary, edged apricot.

Sir Lancelot.—White perianth, cup canary-yellow, edged madder-scarlet.

Torchlight.—Perianth pale - primrose, cup golden-orange and fiery scarlet.

Vanessa.—Flower small, clear-yellow, flat cup.

Zenith.—Perianth creamy-white, cup canary-yellow, frill scarlet.



Fig. 79.—*Narcissus incognita*



Fig. 80.—*Narcissus Seagull*

BARRII, INCLUDING BURBIDGEI

Albatross.—Perianth white, cup citron-yellow, edged orange.

Barri conspicuus.—Yellow perianth, broad cup edged orange-scarlet, a great favourite for all purposes.

Beacon.—Creamy-white perianth, cup orange-red.

Burbidgei.—White perianth, small primrose cup, margined cinnabar-red, good for naturalizing.

Cossack.—White perianth, large cup dark orange-red.

Cresset.—White perianth, cup yellow, edged scarlet.

Firebrand.—Perianth creamy-white, cup fluted, fiery red.

Incognita (fig. 79).—Flat white perianth, frilled crown, yellow margined, apricot-orange.

Major Spurrell.—Snowy-white perianth, crown yellow, edged dark orange-red.

LEEDSII, EUPHARIS FLOWERED OR SILVER-WHITE FRAGRANT STAR NARCISSI

Comprising all the Star Narcissi (large chalice-cupped and short-cupped) which have pure-white perianth segments, cup white, cream, buff-orange, apricot or pale-citron.

Bridesmaid.—Perianth white, cup white, margined pale-primrose.

Duchess of Westminster.—Pure-white perianth, cup soft canary-yellow.

Elaine.—Perianth silver-white, cup white and fluted.

Evangeline.—Perianth white, large citron-yellow cup.

Katherine Spurrell.—White perianth, canary-yellow cup.

Mrs. Langtry.—Perianth white, cup pale-primrose.

Princess Maud.—White perianth, large primrose crown.

Salmonetta.—Perianth white, cup apricot passing to peach.

Silver Moon.—Perianth and cup pure white.

Undine.—White perianth, cup creamy white.

Waterwitch.—A graceful pendulous white flower.

White Slave.—Perianth snowy-white, cup pale-citron.

TRIANDRUS (GANYMEDES)

The white Cyclamen-flowered Daffodil from the mountains of Portugal and Spain, growing in very hard, firm, fine gritty soil, in fissures of rocks; good for pots and rockwork. Prefers shade, a gritty soil, and well-drained position.

Triandrus albus (Angels' Tears) (fig. 76).—A beautiful species of slender growth with creamy-white flowers with globular cup and perianth reflexed as in the Cyclamen.

Triandrus calathinus.—The flowers are produced in clusters of two and three, snowy-white, and twice the size of *Triandrus albus*.

Triandrus concolor.—Produces clusters of dainty fragrant flowers like *Triandrus albus*, but of a soft-yellow colour.

Triandrus pulchellus.—Like *Triandrus concolor*, but the perianth is primrose and the cup white.

TRIANDRUS HYBRIDS

Agnes Harvey.—Perianth pure-white, cup white flushed apricot.

Anne Holloway.—Delicate lemon-yellow.

Bennett-Poë.—Perianth creamy-yellow, primrose trumpet.

Calypso.—Perianth lemon-white, trumpet lemon-yellow.

Diamond.—A beautiful pure-white flower.

Dorothy Kingsmill.—White perianth, lemon-yellow trumpet.

Marie Hall.—White perianth, trumpet sulphur passing to white.

May Hanson.—Pure-white perianth and cup.

Princess Ena.—Perianth creamy-white, trumpet sulphur.

Queen of Spain (fig. 73).—Colour light self-yellow. Supposed to be a wild hybrid. Does best naturalized in grass in partial shade. Also good for growing in pots.

Trilogy.—Perianth white, cup clear yellow.

White Cloud.—Beautiful pure-white.

CYCLAMINEUS

N. Cyclamineus.—The earliest of all daffodils, rich-yellow tube-like trumpet, perianth reflexed as in a Cyclamen. It is only 6 inches high, good for the rock garden and to grow in small pots.

N. JONQUILLA AND JONQUIL HYBRIDS

Buttercup.—A cross between Emperor and Jonquilla, colour rich buttercup-yellow.

Jonquilla (the Single Sweet Jonquil).—Slender growth bearing clusters of small rich-yellow flowers, deliciously scented, much prized for cutting.

Odorus Campanelle (*Campanelle Jonquil*).—Elegant rush-like foliage and cluster of bright-yellow fragrant flowers.

Odorus rugulosus.—Rush-like foliage, rich-yellow fragrant flowers, valuable for cutting.

Odorus maximus.—Dark golden-yellow, flowers twice as large as *Odorus rugulosus*.

TAZETTA (POLYANTHUS OR BUNCH-FLOWERED NARCISSUS)

Specially adapted for winter and spring decoration when grown in pots. The culture is the same as that of the Hyacinth. In flower-beds and mixed borders they produce a beautiful effect. Plant in October or November, but at the approach of winter give a light covering of long litter or other material to keep off severe frosts; remove the covering in March.



Fig. 81.—Market Bunch of *Narcissus tazetta* (*Polyanthus*)

Bathurst.—Perianth yellow, cup golden-yellow, dwarf.

Bazelman Major.—White perianth, large dark-yellow cup.

Double Roman.—Double-white, orange nectary, early.

Gloriosus.—Perianth white, cup orange-yellow, early.

Grand Monarque.—White perianth, cup primrose-yellow.

Grand Soleil d'Or.—Perianth golden, cup deep-orange, early.

Her Majesty.—White perianth, cup deep golden-yellow.

Maestro.—Perianth white, large orange cup.

Orientalis.—White perianth, cup deep orange, very showy, late.

Paper White (Early Snowflake).—The old Paper White Narcissus.

Scilly White.—Perianth white, cup creamy-white, dwarf, early.

White Perfection.—White perianth, cup almost white, dwarf and late.

NARCISSUS POETAZ. HYBRID

A fine new race obtained from crosses between *Poeticus ornatus* and the finest varieties of *Tazetta*; *Poeticus* being the seed-bearing parent. They are strong growers, bearing heads of large fragrant flowers; and are harder than the *Tazetta* varieties.



Fig. 82.—*Narcissus poeticus ornatus*

They are excellent outside, and are good for pot culture.

Admiration.—Primrose-coloured flowers with orange-red cup.

Aspasia.—White perianth and golden cup.

Elvira.—White perianth, bright-yellow cup edged orange.

Ideal.—Perianth white, with brilliant orange cup.

Irene.—Pale-primrose perianth, and golden-yellow cup.

Jaune à Merveille.—Perianth soft-primrose, and bright-yellow cup, edged orange.

Klondyke.—Primrose-yellow perianth, and golden fluted cup.

Triumph.—White perianth, cup golden-yellow.

POETICUS (THE POET'S DAFFODIL)

There are early- and late-flowering varieties; excellent for pots, borders, and wild garden. Mr.

William Robinson writes: "Four years ago I cleared a little valley of various fences. Through this runs a streamlet, and we grouped the Poet's Narcissi near it, also in a little orchard that lay near, and through a grove of Oaks. This year the whole landscape was a picture such as one might see in an Alpine valley."

Almira (King Edward VII).—Large white perianth, eye margined deep-red.

Cassandra.—Broad white perianth, small eye deeply rimmed dark-red, valuable for forcing.

Epic.—Very large flower, eye canary with picotee-edge of madder-crimson.

Herrick.—Slightly reflexed snowy-white perianth, flat eye, deeply rimmed dark-scarlet.

Homer.—Large broad petals, orange eye, deeply margined crimson.

Horace.—Solid white perianth, eye almost entirely blood-scarlet.

Minerva.—White perianth slightly reflexed, eye pale-chrome, rimmed cinnabar-red.

Ornatus (fig. 82).—Broad white perianth, eye margined scarlet, fine for forcing and naturalizing.

Pheasant's Eye (*Poeticus recurvus*).—Pure-white reflexing perianth, eye margined deep orange-red, very fragrant, valuable for naturalizing.

Poetarum.—Perianth pure-white, eye bright orange-scarlet.

Virgil.—White imbricated perianth, eye suffused dark-red.

White Standard.—Very large flower, broad white perianth, cup margined blood-scarlet.

DOUBLE TRUMPET DAFFODILS

Capax plenus (*Eystettensis*).—Queen Anne's Double Daffodil, flowers soft-lemon colour, the six rows of petals symmetrically arranged over each other in the form of a star.

Cernuus plenus (the old Double White Daffodil).—Should be planted in the grass in gravelly loam. Does best in the south and south-west of England and Ireland.

Lobularis plenus.—Flowers yellow, fragrant, dwarf.

Namus plenus.—Rich yellow, dwarf, early.

Telamonius plenus.—The old Double Yellow Daffodil, valuable for naturalizing, also for forcing.

DOUBLE INCOMPARABILIS

Argent.—A cross between *Telamonius plenus* and *Poeticus ornatus*, semi-double flowers, creamy-white petals, orange centre.

Butter and Eggs.—Large double light-yellow rose-shaped flowers, orange coloured centre.

Codlins and Cream (Sulphur Phoenix).—White rose-shaped flowers, sulphur centre, very beautiful.

Dubloon.—Bright-yellow flowers with dark centre, erect habit.

Eggs and Bacon (Orange Phoenix).—Large double white flowers, with reddish-orange centre.

Golden Rose (*Pallidus plenus*).—Flowers very large, light-yellow, with golden-orange centre.

Inglescombe.—Large double flowers, primrose yellow.

Primrose Phoenix.—Large double rose-like flowers, beautiful soft lemon-yellow.

DOUBLE JONQUILS

Jonquilla flore-pleno.—Producing in May clusters of rich golden-yellow small double flowers, very fragrant.

Odorus Camperneli plenus.—A charming variety, bearing heads of fragrant double yellow flowers.

DOUBLE POETICUS NARCISSUS

Double White Poeticus (Gardenia flowered).—Likes a cool deep loam, and frequent replanting, otherwise the flowers go blind.

Nepenthes.—Pitcher-plants are of exceptional interest owing to their wonderful leaf-structure and arrangements for trapping

many of them being mottled; they keep fresh on the plants for about a year.

A moist tropical house is necessary for all the cultivated sorts, except *N. Rajah*, which thrives best in a cool house. They require shade from bright sunshine and plenty of water at the root at all times, daily watering being not too much for them. They prefer a mixture of peat-fibre and sphagnum, such as is used for epiphytic Orchids, and this should be renewed every spring. The roots, which are thin, brittle, and black, require careful handling; washing the soil away from them being preferable to shaking it off. They grow better in teak-baskets than pots. When in active growth a weekly watering with cow-manure water is helpful. If large pitchers are desired, the tops of the shoots should be taken off above from four to six leaves on which pitchers are showing. Leggy plants should be cut down to the base in January, and when new growth shows they should be carefully transferred into fresh soil. When the pitchers open they contain a quantity of liquid. Should this evaporate, water must be substituted or the pitcher will shrivel. Cuttings of healthy shoots root if planted in sandy sphagnum and placed in a close propagating-frame.

The seeds of *Nepenthes* germinate freely in about six weeks if sown on a pan of chopped peat-fibre and covered with a pane of glass. Pitchers are formed on the tiny seed-leaves. With good treatment, plants twelve months old should have leaves 4 inches and pitchers an inch long. If allowed to grow unstopped some of the species develop stems 20 to 30 feet long. The pitchers produced on long stems are

smaller, narrower at the base, usually wingless, and less highly coloured than those on short stems.

Thrips are troublesome to *Nepenthes*. Frequent fumigation with tobacco or "XL-All" will destroy this pest. *Nepenthes* are really easily managed if afforded abundance of moisture and kept in a fibrous sweet condition at the root.

The species in cultivation are:

N. ampullaria.—Free grower, short green pitchers, small lid.

N. Burkei.—Long, wingless, narrow pitchers, green, with large red-brown blotches.

N. Burkei, var. *excellens*.—Pitchers larger and richer in colour, very handsome.

N. cincta (fig. 83).—Stem stout, pitchers 8 inches long, green, flushed red, blotched purple.



Fig. 83.—Pitchers of *Nepenthes*

1, *cincta*. 2, *Curtisii*. 3, *Northiana*. 4, *Rafflesiana*

insects. The pitchers of many of the species are large and ornamental (fig. 83). Their flowers, which are without attraction, are rarely developed by plants under cultivation. When they do they afford opportunity for hybridization, and, as the species cross readily with each other, numerous hybrids have been raised in gardens.

There are about thirty species, all natives of the old world tropics, principally Malaysia. Whilst they show little variation in flower and leaf, there is considerable range of variation in the pitchers, some being no larger than a lady's thimble, whilst others are large enough to hold a quart of water. They vary also in form, and in colour they are either green, brown-red, or crimson,

N. Curtisii (fig. 83).—Pitchers 8 inches long, green, red-brown blotches, elegant lid, broad rim.

N. Curtisii, var. *superba*.—Pitchers larger and richer in colour, rim crimson.

N. Northiana (fig. 83).—Pitchers a foot long, greenish-red striped and spotted crimson.

N. Phyllamphora.—Free grower, thin wavy leaves, pitchers green.

N. Rafflesiana (fig. 83).—Strong grower, large inflated broad-winged green mottled-red pitchers.

N. Rafflesiana, var. *Hookeriana*.—Pitchers shorter and with narrow wings.

N. sanguinea.—Leaves fleshy, rich green, pitchers large, uniform crimson.

plants, natives of South Africa. About a dozen species are grown as decorative plants, and there are also numerous hybrids and seedlings of first-rate merit. *N. sarniensis* has been cultivated in the Channel Islands for 200 years, and is known as the Guernsey Lily. It is supposed that originally a quantity of bulbs were washed on to the islands from a wrecked ship, and established themselves there.

Cultivation.—The requirements of *Nerines* are easily provided. The flower-spikes are



Fig. 84.—*Nepenthes Tiveyi*

N. Veitchii.—Leaves hairy, dwarf habit, pitchers green with wide rim.

The following are garden hybrids:

N. Balfouriana (*mixta* × *Mastersiana*).—Enormous pitchers, highly coloured.

N. cylindrica (*Veitchii* × *hirsuta*).—Long green pitchers, very free.

N. Dicksoniana (*Rafflesiana* × *Veitchii*).—Pitchers very large and richly coloured.

N. Mastersiana (*sanguinea* × *distillatoria*).—The finest hybrid, very free.

N. mixta (*Curtisii* × *Northiana*).—Pitchers large, highly coloured, free.

N. Morganæ (*Hookeriana* × *Phyllamphora*).—Elegant habit, bright-red pitchers.

N. Sedeni (*distillatoria* × unknown).—Free, pretty little crimson pitchers.

N. Tiveyi (fig. 84) (*Veitchii* × *Curtisii superba*).—Very large richly-coloured pitchers.

N. "W. T. Thiselton-Dyer" (*Dicksoniana* × *mixta*).—Enormous pitchers, richly coloured.

Nerine (fig. 85).—A genus of useful autumn- and winter-flowering bulbous

developed in the last quarter of the year, and usually precede the foliage. Growth continues all winter and finishes in April, when the leaves turn yellow and fall off. A pot-bound condition is favourable to the production of flowers. The bulbs may be allowed to crowd (they produce offset-bulbs freely), and a 9-inch pot may hold as many as twenty bulbs all huddled together. Under good treatment the majority of these flower annually.

In repotting, as a rule, the whole mass of soil, roots, and bulbs should be transferred intact to a larger pot. The best time is immediately after the flowers have faded, though some growers prefer to repot in July, when the bulbs are at rest. A light loam, or a mixture of loam and peat with a little sand, may be used. Sometimes a top-dressing will be found sufficient. A little water may be given after potting or top-dressing, but the soil should be kept

quite dry until the flower-spikes show. They should be placed in a sunny, cool greenhouse to flower. Whilst making new growth, that is, from the end of the flower-season until April, the plants should be kept in a sunny house or frame, close to the glass, in a temperature not lower than 50° at night. Air should be given on all favourable opportunities.

After the leaves have faded, the plants should be placed in a sunny, dry position,



Fig. 85.—*Nerine curvifolia*

rapidly and flowers profusely every autumn. It bears scapes 2 feet high and large heads of beautiful pink flowers. Hybrids between it and other *Nerines* have been raised.

N. Cami.—Scape 12 inches, with ten-flowered umbels, colour rosy-scarlet.

N. curvifolia (*Fothergilli*) (fig. 85).—The largest and best of the species, and a parent of the best garden hybrids. Scape 18 inches, bearing a twelve-flowered umbel, 6 inches through, each flower 1½ inches wide with broad reflexed segments and long filaments; colour bright glistening scarlet. Specimens in 10-inch pots have borne sixteen heads of flowers. They last about a month. *N. Meadowbankii* is a form of this.

N. elegans-cœrulea.—A sturdy hybrid with large umbels of crimson flowers tinged with blue. *Elegans-alba* has pure-white flowers.

N. flexuosa.—Leaves and flowers together. Scape tall, flexuose, umbel ten- to twenty-flowered, the flowers declinate, wavy, pink, with a darker keel. Stamens and style curved. There are several named varieties.

N. Manselli.—The largest and one of the best. Leaves wider than others, produced along with the scape, which is 2 feet high, stout; umbel 6 inches through, composed of twelve to eighteen flowers, each 1½ inches long, with broad, recurved segments, and coloured sparkling-rose.

N. Moorei.—Like *N. curvifolia*, but with green not glaucous leaves, a compressed scape 9 inches long, and a nine-flowered umbel of large bright-scarlet flowers.

N. pudica.—Remarkable in the genus in having ivory-white flowers in loose umbels on scapes 12 inches long; they are bell-shaped and 1 inch long.

N. sarniensis (*Guernsey Lily*).—Scape 1 foot, umbel of ten to twenty bright rose-red flowers, each 1¼ inches, with red filaments; leaves narrow, bright-green.

Var. *corusca*.—Foliage broad, umbels of large bright-scarlet flowers.

Var. *Plantii*.—Scapes longer than type, and flowers cherry-red.

Var. *profusa*.—Flowers bright-scarlet, narrow segments.

Var. *rosea*.—Flowers large, deep-rose.

A number of late-flowering seedlings after the *N. curvifolia* type have been raised by Mr. Elwes. They are named in compliment to Lady Lawrence, Lady Bromley, Lady Carrington, &c.

Pæony.—There are two distinct sections of this showy genus, namely, Tree and Herbaceous.

Tree Pæonies form substantial, robust, open-branched shrubs, sometimes attaining 6 feet in height, with greyish, rugged stems, and very prominent scattered leaf-buds, followed by large flower-buds, which in spring expand into blossoms of great size and beauty. They are liable to injury from frost or cold wind if not protected with hurdles or mats. They are seen at their best when grown in pots and started in a greenhouse in early spring. The Japanese have raised many beautiful varieties of *P. moutan*. A second species, *P. lutea*, has also been used as a breeder with success. It has woody stems, a foot or so high, and yellow flowers.

a frame with a south aspect being best, and exposed to full sunlight whilst being kept absolutely dry. Upon this process of ripening and resting the succeeding crop of blooms depends. Seeds are ripened by cultivated plants, and these ought to produce flowering bulbs in about three years.

N. amabilis.—Scape 12 inches, with large umbel of bright-pink flowers.

N. atrosanguinea.—Scape 16 inches, flowers 2 inches wide, wavy segments, colour deep salmon-rose.

N. Bowdeni.—Introduced from S. Africa in 1903. The largest and strongest species, also the hardiest, as it is perfectly happy at the foot of a warm plant-house wall, where it increases

The best hybrids between *P. moutan* and *P. lutea* are La Lorraine, with double flowers coloured sulphur-yellow shaded with salmon; L'Espérance, with single yellow flowers; Madame Henry, pink and red with a purple base; and Souvenir de Max Cornu, flowers double, yellow and orange.

Selection of Moutan Varieties

Abraham Lincoln, Athlete, Belle d'Orléans, Comtesse de Tudor, Elizabeth, Flora, George Paul, Henry Irving, Impératrice Joséphine,

that end, as their size and the brilliancy of their colours render them visible at a greater distance than any other flowers. They are also most imposing in large beds. Narcissus may be planted with good effect amongst them to give early flowers in spring, and Gladiolus also are suitable companions for them, as they flower in late summer. Pæonies are invaluable for cut-bloom, and if gathered in a young state, when only a few petals show, they keep for a week in water. The plants are perfectly hardy, and they with-



Fig. 86.—Herbaceous Pæony—Double Red

Jeanne d'Arc, Louise Mouchelet, Madame de Vatry, Madame Stuart Low, Reine des Violettes, Reine Elisabeth, Robert Fortune, Ville de St. Denis, Zenobia.

The Herbaceous Pæonies have received special attention from breeders, and many varieties have been raised by Japanese, English, French, American, and Belgian growers. They are most accommodating garden plants, for they will thrive in poor soil and in shade as well almost as in bright sunshine. They display their beauty best in the front of large shrubberies and plantations or on the sides of a carriage-approach to a mansion, and when distant effect is required, no plant so admirably answers

stand any amount of cold or heat, and no vermin, insect, slug, blight, or mildew attacks them; they grow in any soil, but they well repay for deep trenching of the land and manuring highly, and watering in dry weather. Mr. William Kelway, about forty years since, got together all the known species, and hybridized them with great success, raising scores of new kinds, both double- and single-flowered, some of them being scented. The leaves are useful in autumn for decoration. The young shoots in spring are coloured rich reddish-brown, changing as they mature to bright green, again assuming rose-red or purple-brown tints in autumn.

Herbaceous Pæonies, Double-flowered

Albert Crousse, Arethusia, Ceres, Comte de Nanteuil, Curiosa, Delicatum, Duchesse de Nemours, Faust, Frigidus, Humei Carneia, La Reine, Ladas, Lady Sefton, Louis van Houtte, Madame Jules Elie, Marie Lemoine, Nivalis, Officialis alba plena, Reine des Roses, Sanguinea, Sosthenes, The Queen, Vestia, Zoe Calot.

Herbaceous Pæonies, Single-flowered

Alton Locke, Albiflora grandiflora (fig. 87), Diana, Dorothy, Enchantress, Gertrude, Hermes, Hypatia, Ivanhoe, Jenny Lind, Larissa, Louis des Estres, Minerva, Morven, Ophia, Queen of May, Rabelais, The Bride, The Moor, Venus, Victoria, Whitley, W. B. Yeats.



Fig. 87.—*Pæonia albiflora* (var. *grandiflora*)

Pelargoniums.—The garden Pelargoniums, including what are popularly known as Geraniums, consist of four sections, viz. Show, Fancy, Zonal, and Ivy-leaved, each containing large numbers of varieties, are the result of cultivation and selection extending over a period of more than a century. About 700 varieties were awarded certificates by the Royal Horticultural Society in the period between 1860 and 1890.

Much information concerning the early sorts can be obtained from Andrews' *Monograph of the Genus Geranium* (1805), which contains beautifully drawn coloured figures of the principal species and varieties then in cultivation. The accidental crossing of one sort with another evidently occurred in Andrews' time. He says: "The introduction of the African species within the last twenty years from the Cape of Good Hope,

whose prolific character seems to know no bounds in the production of endless seminal varieties, which, Proteus-like, appear in ever-varying forms, and for which numerous variations we are indebted to the industrious bee, which conveys the pollen from one plant to another". Sweet's *Geraniaceæ*, a work of five volumes, published 1820–30, containing 500 coloured portraits of Pelargoniums, nearly all of garden origin, gives much information as to their early history in the garden. About 170 species are known, nearly all natives of South Africa.

ZONAL PELARGONIUMS (fig. 88).—This section includes the bedding or scarlet Geranium, Bi-color, Tricolor, and Gold-leaved Geraniums, and the highly-developed Zonal proper, usually grown for the greenhouse and conservatory in winter. They are all supposed to be descendants from *P. zonale* and *P. inquinans*.

Cultivation.—Cuttings of these may be struck at any season of the year. If, however, good pot-grown plants are desired, cuttings put in in February are to be preferred, as they start into growth immediately, and form dwarf stocky plants by May, after which they are best kept in a frame if they are to be grown on for flowering in winter. When their flowers are about over, the plants should be rested in a cool house for a few weeks, keeping them dry, treatment which tends greatly to sweeten the soil. The following February or March the plants should be cut back, which provides the needful stock of cuttings for a spring strike. When they have broken into fresh growth, they should be repotted, reducing the balls sufficiently for them to go back into the same size of pot. Later in the season, as summer advances, these older plants will require another shift. When well established, they will prove useful to follow the Show and Fancy sections in the conservatory. Full exposure to light and air is a *sine qua non* in Pelargonium culture; without this the stocky habit so much desired cannot be expected.

The plants for late or winter flowering should be stopped up to the end of August, whilst at no time previous to this should any flowers be allowed to develop. When coming into flower, they need a slight warmth, say 45° to 50° as the minimum, with a free circulation of air to keep down damp. These winter-flowering plants do not require nearly so much water as those that flower earlier in the year. Weak doses of artificial manure, alternately with farm-

yard liquid given weekly, assists growth.

Zonal Pelargoniums, when grown as standards, serve a distinctly good purpose for grouping with other plants of shorter growth. It will probably take two seasons to obtain a stem of say 3 feet in height with a head. The balls of standards ought to be slightly reduced every spring, otherwise they will get into too large pots.

The soil for Zonals should be of turfy loam, leaf-mould, and sand. If, however,

Pink and Rose-coloured.—Caledonia, Cevic, Gertrude Pearson, Henry Compton, Hatfield, Lady Folkestone, Lady Roscoe, Mrs. Brown Potter, Mrs. B. W. Currie, Mrs. Williams, Paris, Sydney.

Purple and Magenta.—Lisbon, Cymric, Lusitania, Neptune, Lord Roberts, Royal Purple.

White.—Albion, Claremont, Duchess of York, Goodwood, Mary Beton, Niagara, Snowstorm, Snowdrop, Venus, Virginia, White Lady.

The variegated-leaved section (Tricolors and Bicolors) are not so much in favour as they were in the latter half of the nine-



Fig. 88.—Zonal Pelargonium

the latter is not good in quality use a little peat instead.

Double Zonals for Pots

Scarlet.—Charles Gounod, Chavarri Hermanos, Decorator, Raspail Improved, Reunion.

Salmon and Rose.—King of Denmark, Lord Derby, Madame Thibaut, Mrs. Lawrence.

White.—Boule de Neige, Hermione, White Abbey.

Single Zonals for Pots

Crimson and Scarlet.—Arabic, Blenheim, Captain Holford, Dr. Rogers, C. Bidwell, His Majesty, Kingswood, London, New York, Paul Crampel, Saxonia, Sir John Llewellyn, The Sirdar.

Salmon and Orange.—Ascot, Campania, Chatsworth, Countess of Hopetown, Dr. Stares, Lady Laurier, Lucania, Mrs. Charles Pearson, Mrs. Ewing, Mrs. G. Cadbury, Phyllis, Queenswood.

teenth century. The following is a selection of the most popular varieties:

Golden Tricolor.—Achievement, Lady Cullum, Masterpiece, Mrs. Pollock, Mrs. Turner, Prince of Wales, Queen Victoria.

Silver Tricolor.—Charming Bride, Dolly Varden, Lass of Gowrie, Mrs. John Clutton, Mrs. Laing, Prince Silverwings.

Gold and Bronze.—Black Douglas, Bronze Queen, Emperor of Brazil, Her Majesty, Mrs. Harrison Weir, Prince Arthur, The Shah.

Silver Variegated.—Bright Star, Flower of Spring, May Queen, Mrs. Kingsbury, Princess Alexandra, Waltham Bride.

Yellow-leaved.—Cloth of Gold, Crystal Palace Gem, Golden Fleece.

SHOW AND FANCY PELARGONIUMS.—The large-flowered or Show varieties (fig. 89) are

the progeny of *P. cucullatum* and *P. grandiflorum*; the parentage of the Fancy varieties appears to be unknown. Although not so popular as formerly, they still have many admirers, and large specimens are not unfrequently seen at provincial flower-shows, plants 5 feet in diameter bearing a hundred or more trusses of flowers being shown by the expert growers.

Culture and Propagation. — Cuttings



Fig. 89.—Show Pelargoniums

formed of well-ripened stocky growths from below the flowering wood, if inserted early in July in sandy soil in a frame or on a shelf in a greenhouse, should be well rooted and fit for potting into 3-inch pots by the first week in September, after which they are best kept in a greenhouse, as near the roof-glass as possible, for the winter. Early in the spring they will be fit to place in 5- and 6-inch pots for flowering. As soon as root-action is again active, they should be stopped to form dwarf compact plants, once only if to flower in May, twice if not required until June or July. These plants will be better than older ones to grow on for the next season. After they have flowered,

they should be stood in a sunny position in the open until the cuttings have been taken, then lay the plants on their sides to ripen. Early in August they should be cut back severely and near to the first stopping, and placed in a frame, giving no water except a daily syringe, until they start into fresh growth. They should then be repotted, reducing the balls sufficiently to get them into a size smaller pot. In spring they will require shifting into 6- or 8-inch pots, stopping the growths as advised. Those plants that are wanted in flower in March or April need not be stopped during the winter, unless the growth is well advanced.

Forcing, for early flowers, should be done in a warm, light house, the plants being hardened off previous to the flowers opening. When in bloom they should be kept in a well-ventilated structure, or the flowers will soon fade. Liquid manure may be given when the plants are well rooted. It is always safer in the winter to keep the plants fairly dry at the roots until quite active growth is in progress. The compost recommended is good yellow loam, well-rotted stable manure, bone-meal, coarse sand, and charcoal. For ordinary purposes, two parts of loam to one part of leaf-soil answers very well.

Show Pelargoniums

Acquisition, Beauty, Bridal Bouquet, Dairymaid, Devonshire Hero, Duchess of Edinburgh, Empress of India, Godfrey's Pride, Godfrey's Success, Joseph Leigh, Lady Decies, Madame Thibaut, Market Favourite, Magpie, Miss Lily Cannell, Mrs. Gordon, Mrs. Walker, Mrs. Forbes, Pearl, President Faure, Prince George, Rosetta, Tina Forbes, Volonté Nationale.

Fancy Pelargoniums

Admiral, Cynthia, Cecilia, H. J. Jones, Kingston Beauty, Marguerite, Pygmalion, Sylph, Sunbeam, Symmetry, The Bride, William Bull.

IVY-LEAVED PELARGONIUMS. — These are descendants from *P. pellatum* and *P. hederæ-folium*. The improved varieties recently raised by M. Jean Sisley are said to have had their origin in a chance cross between an Ivy-leaved and a Zonal. Others have since made the same cross, and we have now a large number of varieties which are of the greatest value in the garden and greenhouse.

Cultivation. — They require the same treatment as the Zonal section. A stock should be raised from cuttings every year, but instead of pruning them back for the next season it will be found better to grow them on, as they do not bear pruning so well as

the Zonals. Being of a semi-climbing or procumbent habit, they are excellent for training on screens or trellises, or as bushes with several sticks as supports. For covering walls or training up pillars in green-houses or conservatories they are admirable, being of rapid growth. For hanging baskets or large vases, too, they are most effective.

List of Varieties

Achievement, Beauty of Castle Hill, Col. Baden-Powell, Galilee, Jeanne d'Arc, J. T.

them within bounds with occasional staking and tying. Some of them are delicate growers, whilst other are vigorous for a time, and then go off suddenly. Firm potting keeps the plants sturdy, and is conducive to good health. The best time to repot any that require it is in the early spring, whether the balls be reduced or not. Immediately after repotting, close treatment for a short time will encourage vigorous root-action; the cool house is then the better place for them. Large shifts should be



Fig. 90.—Scented-leaved Pelargoniums

Hamilton, La Rosière, Leopard, Madame Crousse, Mrs. Hawley, Ryecroft Surprise, Souvenir de Charles Turner.

SCENTED-LEAVED PELARGONIUMS.—These are either species or crosses raised in gardens. They are worth growing for the fragrance of their leaves alone, and many of them are also pretty flowering plants.

Culture.—Generally these require the same conditions and treatment as the Zonals. They may be pruned as in the case of the Shows and Fancies, or grown on from year to year until they get too large. When large plants are grown, they are useful at all seasons, and, as the shoots are at times cut for use in vases, it is not difficult to keep

avoided; indeed plants which have not been repotted for three or four years will continue in good health if cared for as advised in winter. Active growth takes place in June, when an occasional watering with sulphate of ammonia, a tablespoonful to three gallons of water will benefit them. Three doses during the season will be ample. The best position for them is in the open air, in full sunshine, from the end of May until the end of September. The foliage of the highly fragrant varieties, when well dried, is excellent in potpourri.

List of Varieties

Strong Growers.—Capitatum (rose-scented), Purple Rollison and Scarlet Unique, querci-

folium (true oak-leaf), radula (balsam-scented), tomentosum (peppermint-scented), viscosissimum, Pheasant's-foot, Fair Helen.

Medium Growers.—*Ardens* (scarlet), *Attar of Roses*, *filicifolium odoratum*, *fragens* (nutmeg-scented), *Pretty Polly* (almond-scented), *Lady Plymouth* (variegated), *Mrs. Douglas* (dark-zoned), *quercifolium minor*, *Shottesham Pet* (filbert-scented).

Small Growers.—*Citriodora*, *Countess of Devon* (a miniature "Fancy"), *crispum*, *crispum variegatum* (lemon-scented), *denticulatum major*, *Lady Mary* (small foliage), *Prince of Orange*, *Prince of Orange variegated*, *radula*, *Little Gem*.

Pentstemon.—Few hardy plants have been so much improved during the last twenty years as the *Pentstemon*. By crossing *P. Hartwegii*, *P. gentianoides*, and *P. Cobæa*, florists have obtained a race of hardy border plants, remarkably floriferous, large-flowered, and very varied in colour.

Cultivation.—Garden *Pentstemons* succeed well in any good soil, but a deep and rather moist sandy loam is best. If occasionally dressed with manure and leaf-soil, they produce enormous spikes of beautiful flowers throughout summer and autumn. They are grown in masses in beds, in groups in the herbaceous border, or in beds in the flower-garden.

Cuttings formed of flowerless shoots strike root at almost any time of the year, the best time being August or September; the softer the wood, the more readily do the cuttings root. Leafy shoots 4 inches long should be taken, cut just below a joint, and inserted in light sandy soil, well drained, and in pots or pans in a cold frame. Or they can be put in a warm border and covered with a hand-glass, shading them from the sun. Plants that have remained out all the summer will often live through the winter in the open border, especially if some ashes are placed about the roots by way of affording protection in severe weather.

Seeds saved from a good strain generally yield a large percentage of good sorts. If sown in shallow boxes of light soil in February or March in a gentle bottom-heat, they soon germinate. When the seedlings are large enough to handle, they should be pricked off into other boxes and kept in heat for a time, hardening them off before planting them in prepared beds in May or June. Plant them about a foot apart each way in good soil, and in dry weather occasional watering at the roots will keep them growing. If extra strong plants are required by May, seed should be sown in August, and the plants grown in a frame through the winter.

Selection of Varieties

A. W. Armstrong.—Bright-crimson, throat margined carmine.

Arthur J. Ward.—Rosy-lilac, open white throat.

Brilliant.—Crimson-scarlet, large fine form.

Cigale.—Rosy-salmon, white throat.

Crimson Gem.—Dazzling crimson-scarlet, a fine bedder.

Daydream.—Pink, with white throat, fine for bedding.

Ernest Bichat.—Amaranth, white throat.

George Home.—Bright-scarlet, white throat.

Henry Parr.—Rose, white throat, margined crimson.

Jessie.—White, suffused pink.

John Lamont.—Brilliant-scarlet, pure white throat.

Lady Hamilton.—Violet-purple, throat margined violet.

Lord Polwarth.—Rosy-cerise, throat margined crimson.

Lizzie Robertson.—Rosy-carmine, white throat.

Miss Stewart Peter.—Purple, pure-white throat.

Mrs. A. J. Macself.—Clear-violet, white throat.

Mrs. Stephen Williamson.—Pink, white throat, margined vermillion.

Marchioness of Linlithgow.—Pink, white throat.

Mydleton Gem.—Carmine-rose, white throat, fine bedder.

Ninon de Lenclos.—White, very large.

Newbury Gem.—Glowing-crimson, grand for bedding.

Newbury Gem Pink.—A pink form of the above.

Southgate Gem.—Crimson-scarlet, splendid for massing and bedding.

Thomas Hay.—Rosy-scarlet, throat margined crimson.

Phlox (fig. 91).—The popular perennial border Phloxes are said to be the outcome of a cross between *P. paniculata* (*decussata*) and *P. maculata*, the former with tall, erect unbranched stems, ovate-lanceolate leaves, and large terminal panicles of lilac, purple, or white flowers; the latter with shorter stems, spotted with purple, the panicle of flowers narrower, the flowers fragrant, purple or white. They vary in height from 1 foot to 3 or 4 feet, and there is considerable range of variation in the colours of the flowers and in the shape of the leaves.

Although Phloxes are not particular as to soil, they pay for good cultivation. They are too often left to struggle for existence with coarse herbaceous plants and shrubs, and even then they make a good display from July until the frost stops them. But to have them in perfection they should be grown by themselves in large beds in a sunny position on a lawn; if planted in a mixed border they should be set in large groups to be effective, and they should be kept free from the encroachment of their neighbours. The soil for them should be well trenched, and if manure is needed it should be mixed with the lower spit. A

mulch of short, well-rotted dung or leaf-soil should be given every year in May. They enjoy plenty of water throughout the summer. The plants are unfortunately subject in some soils to eel-worm, which attacks the stems at the surface of the soil. A good dressing of lime is recommended as a preventive. It is also advisable to discard those sorts which are most liable to disease. The plants should be lifted, trimmed, and re-

If the stools show a tendency to over-production of stems in spring, the superfluous ones should be taken off and used, if required, as cuttings. In planting the beds, a distance of about 18 inches between each plant is desirable, and this may prove too close for sorts that grow with great vigour.

There are hundreds of named sorts; the following is a good selection:



Fig. 91.—A Border of Phloxes

planted if possible in new soil about every three years.

Propagation.—It is easy to multiply the plants by means of cuttings taken from the base. They should be placed in a frame in slight heat and kept close as for cuttings of Chrysanthemums. When rooted they should be planted in a nursery bed for a year, where they will grow into stocky plants, ready for the lawn-bed or border by March or April. They can also be raised from seeds sown in a little warmth in March. The seedlings should be grown on in a nursery-bed until strong enough to plant outside. Of course seedlings cannot be relied upon as regards colour. The stems are very brittle and are easily broken by wind; they should therefore be staked early.

PHLOX PANICULATA
(Late-flowering)

- Albert Vandal.*—Violet-mauve, crimson eye.
- Arthur Ranc.*—Salmon-orange, large spike.
- Asia.*—Lilac-rose.
- Aubrey Alder.*—Salmon, carmine eye.
- Baron van Dedem.*—Orange-scarlet.
- Border Beacon.*—Salmon-scarlet.
- Coquelicot.*—Orange-scarlet.
- Crêpuscule.*—Pearl-grey, with white edges.
- Duffryn.*—Rich rose-pink.
- Eclaireur.*—Carmine, salmon centre.
- Elizabeth Campbell.*—Light-salmon, changing to pink.
- Embracement.*—Salmon, dark eye.
- Etna.*—Coral-red, maroon centre.
- Eug. Danzanvilliers.*—Rosy-lilac, white eye.
- Europe.*—White, carmine eye.
- Evangeline.*—Salmon.
- F. A. Buchner.*—Pure-white.
- Fiancée.*—Pure-white.

Flocon de Neige.—White, pencilled with pink.
Flora Hornung.—White, large carmine centre.
Fort de France.—Salmon, purple eye.
G. A. Strohlein.—Scarlet-orange, carmine eye.
Gen. van Hents.—Salmon-red, white eye.
Gloire du Mare.—Deep-violet and blue.
Glory of Lindfield.—Cerise, with dark eye.
Geoffroy St. Hilaire.—Greyish-mauve, carmine eye.
Goliath.—Bright-carmine, red centre.
Hodur.—Soft pink, with white eye.
Infanta Eulalie.—Pure-white, very large.
Iris.—Bluish-violet, blue centre.
John M'Leod.—Pale-rose, large carmine eye.
La Neige.—Pure-white.
Le Mahdi.—Violet-blue.
Le Siècle.—Salmon-rose, white centre.
Lord Kelvin.—Brilliant red.
Madame M. Carvalho.—Creamy-white.
Madame Paul Dutrie.—Pink, suffused white.
Meteor.—Soft-pink, white eye.
Mrs. A. W. Alder.—Shell-pink.
Mrs. Oliver.—Salmon, white centre.
Pantheon.—Rosy-salmon.
Reginald R. Cory.—Salmon-rose, shaded mauve, claret eye.
Rijustroom.—Rose-pink.
Roi des Roses.—Rosy-salmon.
Selma.—Pink, cherry-red eye.
Sheriff Ivory.—Light-pink, crimson eye.
Tapis Blanc.—Pure-white, very dwarf.
Violetta.—Deep-mauve, large white centre.
Widar.—Parma-violet-blue, white eye.
William Watson.—Soft-pink, deep-mauve eye.

PHLOX SUFFRUTICOSA
 (Flowering from June to August)

Attraction.—Pure-white, rosy-crimson eye.
Chameleon.—Soft-pink, crimson eye.
George Taylor.—Cerise, dark crimson eye.
Heirloom.—Pure-white, purple eye.
James Hunter.—Rosy-pink.
Lady Napier.—Pure-white.
Miss Lingard.—White, lilac eye.
Sunray.—Bright-rose.
Snowden.—Pure-white.
Thomas Reid.—Rosy-crimson.
Teviotside.—Rose, flaked crimson.
W. Patience.—Light-rose, carmine eye.

PHLOX ARENSII

This useful section has been obtained by crossing the early *P. canadensis* varieties with those of *P. paniculata*. They come in between the early and late varieties, although some flower more or less all summer; they vary in height from 1 to 1½ feet.

The best varieties are:

Charlotte.—White-shaded lilac, very free.
Grete.—White.
Hanna.—Bright-rose.
Helene.—Lilac-mauve.
Kathe.—Purplish pink, dark eye.
Sophie.—Creamy-white, carmine eye.

Phyllocactus.—A very showy genus of hothouse plants, well deserving more care and attention than they usually receive. They are chiefly of hybrid origin, the largest and best varieties being mainly descendants

from *P. crenatus* (fig. 92), *P. grandis*, and *P. latifrons*. The rich-coloured *Cereus speciosissimus* is also responsible for some of the most brilliant tints. They have flattened, notched stems, no true leaves, and the flowers are produced from the notches on the upper portion of the last-matured growths. For soil, a light, yellow, fibrous loam, a fourth part of leaf-mould and a sprinkling of brick and mortar rubble and coarse white sand form a suitable mixture. They do not thrive if over-potted, and, like all plants of the Cactus order,



Fig. 92.—Phyllocactus crenatus

they require a season of rest in a dry atmosphere, and also to be kept dry at the roots, scarcely needing water at all for three months in winter. Propagation by seed, obtained, if possible, from cross-fertilized flowers, may result in new and improved varieties. Cuttings of the stems root freely in the spring if placed in a warm moist house in sandy soil. There is little danger of losing them except by their damping off at the base, through over-watering. They soon fill the pots with roots, when they should be repotted into 4-inch pots in May or June; they will not require to be repotted again until the following March, when they may be put into 7-inch pots. They should always stand in a sunny position, quite unshaded, in a warm airy house. They usually assume a bushy habit, but if they

show a tendency to legginess the tops of the growths should be removed. It is a good plan to turn them out-of-doors after midsummer, in a position well exposed to the sun. Let them have moderate supplies of water. They should be removed into a warm greenhouse before the cold nights. Well-established plants should be started into growth early in the year in order that they may make their growth before midsummer, to be turned out again about that time for the ripening process. This alternation of growth and of rest produces in a few years handsome flowering plants.

The best of the species are:

P. Ackermanni.—Stems broad; flowers rich scarlet. Mexico.

P. crenatus.—Stems very broad; flowers creamy-white and orange, fragrant. Honduras.

P. grandis.—Large flat stems; flowers white, fragrant. Honduras.

P. Hookeri.—Stems long; flowers with long slender tube, white, fragrant. Brazil.

List of Garden Varieties

Adonis.—Large, rose-pink; a good grower, free.

Agatha.—Pink-shaded salmon.

Alice Wilson.—Orange-scarlet.

Brilliant.—Vivid scarlet.

Cooperii.—Creamy-white, a large, elegant flower.

Delicatus.—Pink-shaded salmon.

Ensign.—Deep-scarlet.

Exquisite.—Charming bright-rose.

Favourite.—Pale-rose.

Gilbert Watson.—Large white.

Hecla.—Light crimson-scarlet.

Homer.—Red, violet centre.

Isabel Watson.—Flat-stemmed, otherwise like

J. T. Peacock.

Jessica.—Light soft-pink.

J. T. Peacock.—Rich magenta-shaded violet, large.

Niobe.—Deep-scarlet, purplish centre.

Olivette.—Rose-carmine.

Orion.—Orange-red, shaded with violet-purple.

Plato.—Brilliant scarlet.

Refulgence.—Dark glossy scarlet.

Romeo.—Light-red, pale-purple edge, distinct.

Saizy Watson.—Salmon-pink.

Sirius.—Bright rose-pink.

Sunset.—Fine rich deep-shaded crimson.

Vesta.—Large white.

Poinsettia (Euphorbia) pulcherrima (fig. 93).—This fine autumn- and winter-flowering plant is a native of Mexico. The red variety stands unrivalled for the brilliant colouring of its scarlet bracts, which, when well grown, will attain a length of 9 or 10 inches, lasting long on the plant. The flowers are yellow, but inconspicuous. There is a white variety *alba* and a rose-coloured variety *rosea*. The double variety (*plenissima*) has the cymose

inflorescence branched, and bearing, within the outer bracts, tufts of smaller but equally high-coloured bracts, which mature in succession, and much extend the flowering season. As a winter plant for a warm conservatory, the *Poinsettia* has few equals. It can be brought into bloom at different times, giving a succession for eight or ten weeks. The heads last long when cut and placed in water.

Propagation.—Cuttings, taken off in spring with a heel when the shoots are about



Fig. 93.—*Poinsettia pulcherrima*

4 inches long, inserted in sand, and placed in a brisk heat root readily. They should then be potted singly in 3- or 4-inch pots, in good turfy loam to which is added one-sixth of leaf-mould with a little sand, and kept in a temperature of 68° or 70° at night, with a rise of 10° by day. The plant has an almost uncontrollable habit of running up with a single straight shoot without any disposition to branch. Young plants are grown on without stopping, but to prevent their getting up too high they should be kept all through the growing season with their heads almost touching the roof-glass, and allowed free air when the weather is fine. As soon as the pots get filled with roots move them into others 6 or 8 inches in diameter, using soil similar to that for

the last potting, and treat as before, syringing them freely overhead in the afternoons. Towards the beginning of August, when they have made plenty of roots, they may be gradually inured to more air, and either removed to a house without fire-heat, where they can have air night and day whilst the weather is warm, or stood out-of-doors under a south wall in the full sun for a month; but before there is any approach to cold nights they must be taken inside and kept in a temperature of 50° during the night. Some plants may be put into a warm house in October, where they will come into flower, the remainder being brought into heat later for succession. In a temperature of 55° the flowers last longer than if kept where it is hotter.

Where plants are wanted dwarf, say from 8 to 12 inches high, and in 6-inch pots, about the beginning of September, cut the shoots half-way through, 6 or 7 inches from the top, and leave them in this state upon the plants for ten days until the cut portion has become callused over; then completely sever them and place in 3-inch pots in a mixture of half sand and loam in a close frame, where they will root in about three weeks, after which give air gradually, and ultimately fully expose them; move into 6-inch pots in soil as before advised, and keep them as near the glass as possible. If they show a disposition to get taller than desired, again half-sever them at a similar distance below the tops, and after they are callused as before, take them off and root them.

When flowering is over, put the plants in any out-of-the-way place where a temperature of 55° can be kept up, and here let them remain until May, when they should be cut down and placed in a temperature of 60°. They will here soon push into growth, when cuttings, as required, can be taken off, and the old plants destroyed or grown on if wanted. Where it is desired, they can be grown in succeeding years to a large size by giving them more root-room, cutting them well back each season before starting them into growth, and removing the exhausted soil.

Primrose and Polyanthus.—*Primula vulgaris* is one of our prettiest native plants, and it is most effective when planted in the wild garden in imitation of its position in nature. It may also be used as an edging to a flower border in partially shaded positions. Under cultivation it has varied con-

siderably, one of the most remarkable of all the varieties being the blue-flowered primrose, raised by Mr. G. F. Wilson. There are purple, crimson, rose, and white sorts, some of them double-flowered. They reproduce themselves fairly true from seeds, which should be sown early in spring in boxes or pans in a cold frame, pricking the seedlings out on a moist shaded border as soon as they are large enough to handle. If to be used for filling beds for spring effect they should be grown on in rich, moist soil in



Fig. 94.—Polyanthus

a shaded position in a nursery or kitchen-garden bed until October, when they may be lifted and planted in the flower-beds, watering them in freely if the weather be at all dry. Here they may remain till May, when they will require fresh quarters for the summer. They should be lifted and broken up if an increase of stock is required; indeed single offsets make the best plants by the following spring; they may be planted in a bed as advised for young seedlings. Very choice varieties can only be kept by this annual division, but they do not always produce offsets freely.

Although there is a well-marked difference between the true Primrose and the Cowslip (*P. veris*) they are really very closely related, and consequently they are supposed to have

crossed in a wild state. "The cultivated varieties, either natural or hybrid, which are generally referred to these two species are numerous. The Polyanthus, *P. variabilis*, is intermediate in character, but its origin is not known with certainty. However, as some of the forms approach the Cowslip, and some the stalked variety of the Primrose, there seems to be little doubt that it is a fertile hybrid between these two species, if indeed they are entitled to that rank. The colouring is endless in its varia-

they flower freely, and the colours of their flowers are pleasing. A bed of selected sorts, such as may be seen at Hampton Court in June, is a delightful floral picture. The laced varieties are particularly rich in colours, velvety crimson, edged or laced with gold, &c. There are numerous named varieties, but for all except exhibition purposes a packet of seeds from a reliable grower will afford plenty of variety and quality. Their cultivation is the same as for the Primrose.



Fig. 95.—*Primula sinensis*

tions, though limited to various shades and combinations of purple, red, and yellow. There is a curious variety called the Hose-in-hose, remarkable for the calyx being an almost exact counterpart of the corolla. Another race of cultivated varieties belongs to the Primrose, agreeing with that in having the flower-umbels sessile. The flowers are larger, however, in the so-called typical form, and hence it has received the name *grandiflora*. The varieties in cultivation are more or less double, and range from nearly pure white, yellow, and lilac, to deep crimson" (W. B. Hemsley).

The Polyanthus is certainly one of the most charming of hardy spring-flowering plants. Where Daffodils or Tulips are favourites, there also should Polyanthus find admirers. They are easily cultivated,

Primula sinensis (fig. 95).—This plant, as its name implies, is a native of China, and has been introduced now some eighty years; but it is within the last thirty that the greatest advance has been made by raising improved varieties, both double and single. The plants are most serviceable in the conservatory and greenhouse during winter and spring.

A few years ago the wild type was reintroduced, and, by crossing it with a garden variety, a taller loose-habited strain was obtained and was named *P. stellata*.

It is usual to raise fresh plants every year from seeds, destroying the old ones as soon as they have flowered or have ripened seeds, except in the case of any that may appear to possess some superior quality. The first sowing should be made

early in March. The seeds require care in sowing; in all stages, from the seed-pan up to maturity, Primulas cannot bear any approach to stagnant moisture in the soil. The soil for seeds should consist of three parts good loam, one part sand, and one well-rotted leaf-mould, sifted, and well mixed; fill the pans to within an inch of the rim, make moderately firm, and press the surface smooth; give a gentle watering to settle the soil, and then sow the seeds evenly, lightly covering them with fine soil. The pans can then be placed in a cold frame and covered with a pane of glass, shading with paper. Little water will be required until the seedlings are visible, when a little ventilation is necessary, and as they gain strength more air should be admitted, care being taken to shade from bright sunshine. When large enough they should be pricked off into pans, an inch apart, and returned to the frame, keeping them close and shaded until established, when they may receive cooler treatment. Their next shift should be singly into 3-inch pots, keeping them close for a few days. Shift again into 5-inch pots, taking care to encourage, by means of light and ventilation, sturdiness of growth. They delight in a moderately open and rather rich compost, consisting of six parts of turfy loam and one part each of well-decomposed cow-manure, leaf-soil, and silver sand. The pots need efficient drainage, so that water may pass away freely from the roots; the soil should be made rather firm. After May the plants do in a cold frame. Water them freely during the summer, but in autumn and winter give just enough to maintain a moderate moisture in the soil. An airy position a short distance from the roof-glass suits them during winter, with a temperature not below 50 degrees.

The Chinese Primula is exceptionally well cultivated in the neighbourhood of Birmingham, very large specimens 2 feet or more in diameter, with large massive foliage and very fine flowers, being annually exhibited in November. The seeds are sown as soon after ripening as possible. The young plants are pricked off when ready, and potted into small pots when large enough. They are wintered in these pots, on shelves very close to the glass. At the turn of the year, when the plants show signs of fresh growth, they are shifted into 5-inch pots, and kept close to the glass in a warm greenhouse temperature. In June they are put into cold frames, kept close to the glass,

shaded during the brightest part of day, plenty of air being judiciously given early in the day, reduced or closed altogether according to weather before the sun has left the glass. The final shift into 8-inch pots is given soon after the plants are removed into cold frames. They are allowed plenty of room during the whole growing season. Weak cow-manure water, with soot, is beneficial when the plants are well-rooted. A sharp look-out is kept for green-



Fig. 96.—*Primula obconica*

fly. About the middle of September the plants are moved into a cool, airy greenhouse to flower, and from November onwards many of them become perfect pyramids of bloom from purest white to deep crimson, lasting for several months in beauty.

Several fine double and semi-double varieties have been produced from seed; the former are increased by means of cuttings; the latter come fairly true from seed.

The old double white is largely propagated by means of cuttings planted in pots of light sandy soil in a moderate heat. Another plan, that of layering, is: as soon

Fig. 97.—*Primula japonica*

as the old plants have gone out of bloom fine coco-nut fibre is piled up among the shoots, which soon root into it; they are then taken off and potted. Some growers partly sever the shoots with a knife, in the belief that it induces a quicker root-development.

Other *Primulas* that have become popular greenhouse plants in recent years are:

P. obconica (fig. 96).—A native of China with heart-shaped hairy leaves and umbels of stellate flowers on erect stalks. The flowers vary in size and in colour, white, pink, red, and lilac-purple, and they are very decorative. Plants are raised annually from seeds, and are grown in frames or greenhouses to flower in winter. The hairs on the leaves have toxic properties, and cause a disagreeable skin rash on some persons who handle the plants.

P. japonica (fig. 97).—One of the showiest species, hardy in the warmer parts of England, but quite a useful plant for the greenhouse. It varies in colour from white to crimson, and is best treated as an annual, as it ripens seeds freely. In habit and leaves it resembles the common Primrose, but is much larger; the flowers are borne in whorls on stout, erect spikes.

P. malacoides.—A native of China, now largely cultivated in small pots for table decorations. It has small roundish foliage, and the smallest plants produce numerous thin stalked, branched

spikes of elegant white or mauve Forget-me-not-like flowers, which last for weeks. It is easily raised from seeds, which should be sown as recommended for *P. sinensis*, and the plants grown in a cool frame. They flower in winter.

P. kewensis.—A hybrid between two yellow-flowered species, *P. floribunda* and *P. sikkimensis*. It forms a bushy pot plant and flowers in winter.

Pyrethrum (fig. 98).—*Pyrethrum roseum* has been so greatly improved by the florist that the fine double-flowered kinds may be said to fill such places in May, June, and July as the Aster and Chrysanthemum fill in autumn. During the last fifty years or so Mr. Wm. Kelway and others have produced numerous varieties, both single and double, by continuous cross-breeding and selection.

They thrive under ordinary conditions, responding readily to liberal treatment, and are useful either for beds or to form masses in flower borders. They are propagated by division after the plants have done flowering, and also from cuttings made of the side-shoots formed at the end of the summer. These should be set in a cold frame, or under a hand-glass in a shady border. When rooted they can be planted out either in the autumn or early spring.

The double-flowered varieties do not seed easily, and the seedlings are generally inferior. The single varieties are better in

Fig. 98.—*Pyrethrums*

this respect. The seed should be sown in pans in early spring and placed in a cold frame or on a shelf in a cool greenhouse, covering them with a pane of glass, and shading until they germinate.

Selection of Sorts

Single-flowered.—A. M. Kelway, Countess of Onslow, Clio, Emblem, Evelyn, Fairy, Figaro, Grace, Hamlet, Iona, James Kelway, Jessie, Juno, Mrs. Bateman Brown, Octoroon, Pink Pearl, Punch, Queen of the Whites, R. Carruthers, Sir Hugo, Snowflake, Tasso, Venus, Vivid.

Double-flowered.—Aphrodite, Beauty, Captain Nares, Dora, Ernest, Evelyn, Godiva, Hercules, Leonard Kelway, Lord Rosebery, Magician, Mont Blanc, Nancy, Onar, Prinrose, Queen Alexandra, Queen Mary, Toison d'Or, White Aster.

Rhododendron.—The species of *Rhododendron* now cultivated in gardens are very numerous. The hardy ones are dealt with in the article on HARDY TREES AND SHRUBS, Vol. IV, p. 91. Here it is proposed to deal with the hybrids and seedlings of garden origin.

No shrubs, not even Roses, have been hybridized with greater success than *Rhododendrons* have. Their popularity is largely due to their hardiness, their evergreen character, and their good nature under ordinary garden conditions, whilst their floral beauty is equalled by very few of the great variety of shrubs now grown for decoration.

They object to soils containing lime or chalk, preferring peat or a light sandy loam, and they delight in sunshine, provided they get a good supply of moisture in the atmosphere and at the root. Generally the plants are long-lived; they do not object to severe pruning, and they can be transplanted with safety at practically any age, and at any time between 1st October and mid-May. Their roots keep near the surface, and they form a close mat of fibres which imbibe moisture readily.

Although *Rhododendrons* like sunshine, provided they are not baked, they do not object to a certain amount of shade, such as that afforded by a belt of trees on the south of them, or that of an open plantation of pines and similar tall trees. Some of them are planted to form undergrowth; *R. ponticum*, for example, is an ideal shrub for this purpose.

Soils on which Spanish Chestnut, Birch, and Pine thrive are likely to satisfy *Rhododendrons*. Where beds have to be prepared for them, a mixture of equal parts of heather peat, light loam, leaf-mould, and sand is

best, and this may also be used for plants grown in large pots and tubs. It is better to plant on mounds formed of prepared soil where the natural soil is limy or otherwise unsuitable, than to take out the soil and make new beds on the same level, as in time the new compost is certain to become impregnated with lime from the surrounding soil.

Propagation.—Seeds, cuttings, layers, and grafts are all easy means of multiplying *Rhododendrons*. The seeds, which are very small, should be sown soon after they are ripe in pans of fine light peaty soil in warmth, and the seedlings pricked out as soon as they are large enough to handle. Plants raised from seeds are slow to flower compared with those raised from cuttings or grafts taken from flowering bushes. Seeds are not of any use for multiplying hybrids, but for all the species they are a satisfactory means of propagation.

Layering is a good method for raising fresh stock on their own roots. The plants are easy to layer. The weaker branches are selected and, after partly slitting them in the usual way, they are pegged down in mounds of peaty soil, where in time they strike root and are fit to be severed from the parent plant in about two years.

Cuttings are not often resorted to for *Rhododendron* propagation, though they strike root readily when placed in heat. For some reason this method is considered less reliable in this country than it is in others, Germany, for example, where large numbers of *Rhododendrons* are raised from cuttings set in very sandy peat in heated frames in November. The indoor sorts are usually propagated by means of cuttings, the Malayan section being multiplied in no other way. The North American *Azaleas* are readily propagated from cuttings of half-ripened shoots.

Grafting is the preferred method in this country for all the hardy *Rhododendrons* of the *Caucasicum* breed and the *Indicum* section, popularly known as Greenhouse or Indian *Azaleas*. *R. ponticum* is the species generally used as a stock for the evergreen hardy *Rhododendrons*, and, although it is not suitable for some of the sorts, it is good for most of them. It is apt to be troublesome by sending up suckers, but that is an evil that is common to practically all grafted plants. For the less hardy species and hybrids *R. arboreum* or *R. campanulatum* is a suitable stock.

The operation of grafting in the case of

Rhododendrons is easily performed. Generally the stock, a seedling in its third year, is cut down to within about 4 inches of the base and the scion is attached either by the wedge, saddle, or side method. They soon take if kept in a close moist frame. The best time for grafting is in the first quarter of the year, but with a little care the operation can be successfully performed at almost any time.

Port, Othello, Purpureum elegans, Sefton, Sylvia, Fastuosum, Nero.

Two-coloured.—Sappho, Marchioness of Lansdowne, Mrs. Hennage, Mrs. R. G. Shaw, Jas. Mason, Mrs. J. Penn, Maggie Heywood, Mrs. A. Walter, Helen Waterer, Lady Grenville, Lady C. Walsh, Marie Stuart.

GRIFFITHIANUM HYBRIDS

For many years *R. Griffithianum*, formerly *R. Aucklandii*, was used as a breeder by



Fig. 99.—Rhododendron Mrs. Stirling

HARDY EVERGREEN RHODODENDRONS

White-flowered.—Album elegans, Baroness Schroöder, Fair Helen, George Hardy, Mme Carvalho, Minnie, Memoir, Mrs. J. Clutton, Mrs. J. Waterer, Mrs. T. Agnew, Snowflake, The Queen.

Blush-Pink.—Concessum, Lady Grey Egerton, Mrs. W. Watson, Pink Pearl, Rosabel, Alice, Gomer Waterer, Mrs. Stirling (fig. 99), Mrs. W. Agnew, Princess Hortense, Strategist, Surprise.

Rose-Pink.—Garibaldi, Kate Waterer, Lady Armstrong, Lady C. Mitford, Mrs. C. Sargent, Mrs. J. Waterer, Mrs. R. S. Holford, Titian, W. E. Gladstone, Broughtoni, Lady E. Cuthbert, Mrs. J. Kelk.

Red.—Chas. Bagley, C. S. Sargent, Lord Palmerston, Doncaster, E. S. Rand, F. G. Waterer, A. B. Mitford, Caractus, F. D. Godman, John Waterer, Duchess of Bedford, John Walter.

Purple.—Baron Schroöder, Jas. Nasmyth, Everestianum, G. B. Simpson, Milton, Old

a few experts, and there are now quite a large number of hybrids and of second crosses in which the characters of this large flowered species are more or less in evidence. One of the first hybrids was *R. Manglesii* (fig. 100), and soon after it came *R. Kewense*. These were surpassed by the Cornish beauties, Beauty of Tremough, Glory of Penjerrick, Goliath, Gill's Triumph, and Cornubia (fig. 101). Two others of first-rate quality, raised at Haslemere, are Isabella Mangles and Liza Stillman. More recently *R. Loderi*, the largest-flowered of all, was raised at Leonardslee. White Pearl and The King are two more of them. These are all magnificent where soil and climate are suitable, as, for example, in South Cornwall and south-west Ireland; they

are rather too tender for out-of-door cultivation in the less favoured parts. They are sometimes grown in large pots and tubs for the conservatory, and, with a little care, they can be made to flower freely every spring.

DECIDUOUS RHODODENDRONS

Formerly known as Ghent or Swamp Azaleas, these are the result of intercrossing the several North American species, *calendu-*

the dark and syringed several times a day. Under this treatment the buds swell rapidly, and when they begin to open out the plants are gradually given more light and a lower temperature. Successive batches are treated in this way.

The unnamed seedlings are generally of good quality. A few of the best named sorts are: Anthony Koster, Littleworth Beauty, Oswald de Kerchove, Louis van Houtte, Ne Plus Ultra, and Gloria Mundi.



Fig. 100.—*Rhododendron Manglesii*



Fig. 101.—*Rhododendron Cornubia*

laceum, *viscosum*, &c., the Chinese *sinensis* (*mollis*), and the Caucasian *flavum* (*ponticum*). They are very decorative, their flowers being mostly soft shades of yellow, salmon, orange, and scarlet, and they are very free flowering. Their hardiness is beyond question, but they flower rather early in the year and therefore are sometimes nipped by frost. Another value they have is in their rich leaf coloration in late autumn. The collection of these plants at Kew is a great attraction in May and June.

They are largely grown for forcing into flower early in the year. In January the plants are placed in a stove temperature in

RHODODENDRONS FOR THE GREENHOUSE

Many of the tender species from the Himalayas may be successfully grown in a conservatory. They require little or no fire-heat, and when in growth they delight in plenty of moisture. Such are *R. argenteum*, *R. arboreum*, *R. Griffithianum*, *R. ciliatum*, *R. Dalhousiæ*, *R. Edgeworthii*, *R. Falconeri*, *R. formosum*, *R. Maddenii*, *R. Nuttallii*, *R. niveum*, *R. Thomsoni*, and *R. Veitchianum*. The hybrids with *Griffithianum* blood in them are also suitable for this purpose (see p. 102). There are other hybrids, namely: Countess of Haddington,

Victorianum (fig. 102), Princess Alice, Fragrantissimum, Forsterianum, and Henryanum, which are grown usually in tubs for the conservatory, making a great show of fragrant bloom early in the year.

Malayan Rhododendrons.—These hybrids were for a time in favour as shrubs for the warm greenhouse. They differ from the ordinary run of the genus by their rather fleshy wax-like flowers and pleasing soft colours. They were raised by Messrs.

Richardia.—For upwards of a century *R. Africana*, the Calla or Arum Lily, has been cultivated in gardens. At rare intervals other species have been introduced, but none of them became popular until after the advent of two yellow-spathed species in the early nineties. As the value of these two plants became known, attention was given to the earlier introductions, with the result that seven species are now fairly common.

Like many other genera of Aroideæ, the



Fig. 102.—*Rhododendron Victorianum*

J. Veitch & Sons, Chelsea, from *R. javanicum*, *R. malayanum*, and several other species from the Malay regions. They require a good deal of moisture and some shade, with a minimum temperature of 55°; they are, in short, stove plants. Properly managed they form evergreen shrubs up to 6 feet or so high, and they are in flower practically all the year round. They thrive in a well-drained sandy peat.

Half a dozen of the best varieties are Brilliant, King Edward VII, Ne Plus Ultra, President, Duchess of Edinburgh, and H. J. Mangles. The species of *Rhododendrons* including those recently introduced from China are dealt with in the article on HARDY TREES AND SHRUBS (Vol. IV, p. 91).

true flowers are inconspicuous, but they are surrounded by a large, usually handsome, spathe, which is popularly known as the flower. To obtain well-developed, clean spathes, generous treatment must be given. *R. Africana* is the hardiest, and in places where severe winters are not experienced, is a success when used as a semi-aquatic plant on the margins of lakes or streams. In some parts of Cornwall it has become naturalized in the rich mud of lakes, where it increases with rapidity, and in summer bears quantities of large glistening white spathes. In less-favoured localities it requires the protection of a greenhouse or frame for the winter and spring. When potting, a mixture of good loam, two parts, and rotten

manure, one part, with a little sand, should be used. Abundance of water is required during growth, with frequent applications of manure-water when well rooted. By cutting out the weak shoots much finer spathes can be had. The flowering period indoors is from October to May, out-of-doors from May to October. In addition to the type there are several named forms, such as *Little Gem*, with leaves and spathes less than a foot high; *compacta*, intermediate in size; and *gigantea*, with extra-sized spathes.

purple at the base, small, the whole plant smaller and weaker than *R. Africana*.

R. Elliottiana (fig. 103).—The first of the bright yellow-spathed species to be introduced. It was exhibited for the first time in 1892, when £600 was offered for the three plants, and refused. It is equal to *R. Africana* in size, the leaves are irregularly blotched with white, the spathes are rich-yellow with a purple blotch at the base, and they may be had at almost any time of year.

R. hastata is very like *R. albo-maculata*, but the leaves are wholly green, and the spathe is greenish-yellow with a purple blotch.

R. melanoleuca grows 2 feet high; leaves green



Fig. 103.—*Richardia Elliottiana*

The newer species require more heat, an intermediate temperature being suitable. Like the former they require liberal feeding, but the potting material should be lighter, manure being replaced by leaf-mould or peat. They should rest in the winter, be started into growth in February, and flowered during summer. All can be readily propagated by division.

The following are the species in cultivation; all are South African:

R. Africana (*æthiopica*), 2 to 3 feet high, leaves sagittate, the blades often 1 foot or more long. Spathe on stout scape well above leaves, pure-white, 5 to 10 inches long, surrounding an erect yellow spadix.

R. albo-maculata, leaves hastate, deep-green, spotted with white. Spathe greenish-white,

with white spots; spathe small, white, open at base, showing purple throat.

R. Pentlandii.—A yellow-spathed species similar in habit to *R. Elliottiana*, with less pointed spathes and larger unspotted leaves.

R. Rehmannii.—Singular in having lanceolate, not hastate leaves, and in its spathes being more or less purplish.

Roses.—Roses are beautiful no matter what their position in the garden may be. Grown in borders, beds, in groups in the shrubbery, or in what is termed the wild garden, they are always effective. In many gardens they are grouped by themselves on a more or less formal plan, those of scandent habit being used as a kind of framework to those of bushy growth, the latter being planted in beds.

The most suitable position for a Rose garden is an open spot with an east or southern exposure, and sheltered from strong

not be pleasant to walk upon early in the morning, late in the evening, and after wet weather.

Two plans of formal Rose gardens are shown in figs. 104, 105.

Roses are often planted in beds on lawns, or along the sides of walks. The climbing sorts are used to cover arbours, arches, and pergolas, or to form fences.

Soil.—The Rose prefers a rich, deep, loamy soil, well drained. Heavy clay, and light sandy or gravelly soil, are unfavourable, and should be replaced, either partially or wholly, with soil of the proper description. The addition of manure will in some cases be sufficient to make the soil suitable. Where the soil is light the addition of heavy loam, or even clay, and cow-dung should give it the right consistency. Cow-manure is best for all except rich soils. Before using, however, it should be mixed with a quantity of loam, and laid in a heap for a year, and turned occasionally. Leaf-mould, peat, burnt earth, stable-manure, soot, wood-ashes, crushed bones, basic clay, and lime are all good food for Roses. If the soil is of ordinary quality it ought to be manured every year by mulchings or dressings in winter.

Planting.—The best time to plant Roses is October or November; but, if the ground is not in good order or is of a very stiff

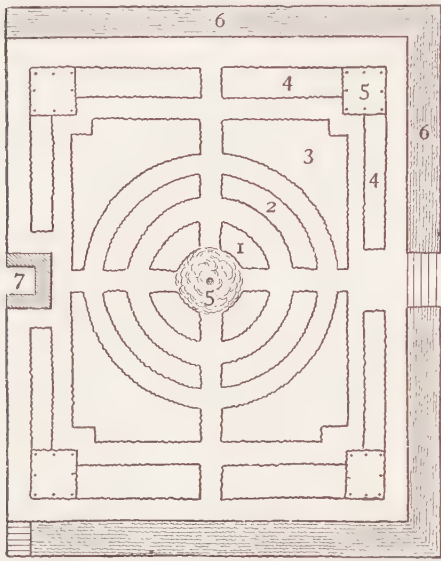


Fig. 104.—Rosery, Hatfield House (Marquis of Salisbury)

1, 2, 3, Standards. 4, Dwarfs. 5, Climbers on iron supports. 6, Grassy slope. 7, Old Palace (now stables).

winds, but not shaded by trees or buildings. The plan and arrangement must be decided by taste, the form of the ground, and

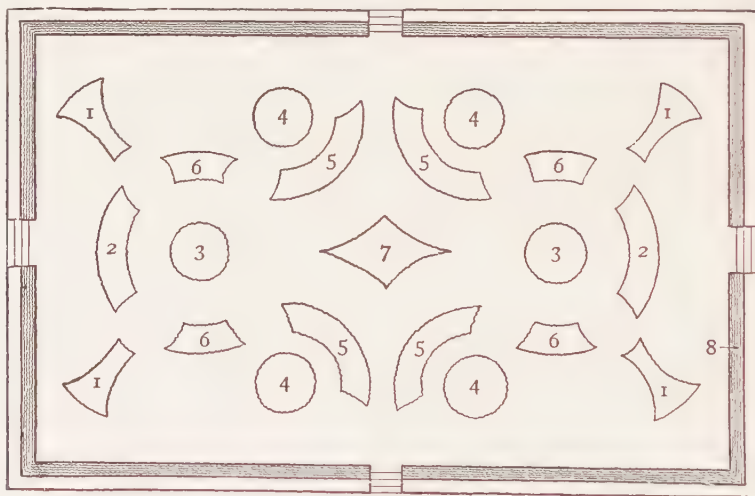


Fig. 105.—Rosery, Mentmore (Lord Rosebery)

Area, 130 feet by 88 feet (Grass) surrounded by walk (8), with arch covered with climbing Roses. Beds—1, Crimson. 2, Pink. 3, Deep pink. 4, White. 5, Crimson. 6, Rose—all dwarfs. 7, Mixed Standards.

other circumstances. The walks may either be of grass or gravel; the former being as a rule preferable when kept nicely mown. The only objection to grass is that it may

nature, early spring is to be preferred. The Teas are liable to be injured by frost if planted in autumn; this operation, therefore, should in their case be deferred till

March or April, or, if the plants are very young, till all danger of frost is over.

Standards should be allowed a space of 3 feet from plant to plant; dwarfs, from 1 foot to 3 feet, according to habit; they may also be planted between standards.

Where Roses are to be planted in beds or singly on lawns, the soil should be thrown out to the depth of 2 to 3 feet, and unless it be of good quality, replaced with good fresh loam mixed with well-

and more tender Teas require protection; for this purpose branches of fern, fir, or other evergreens may be employed, sticking them thickly into the ground among dwarfs, or tying them on the stem so as to protect the head of standards. A mulching of litter, short dung, leaves, or fibrous turf should likewise be placed over the roots.

Pruning.—Roses are pruned according to their habit and the purpose for which they are grown. For some sorts it is neces-



Fig. 106.—A Rose Pergola

rotted manure. Before planting, the soil ought to be trodden to prevent sinking; the roots should be spread out horizontally, within 6 inches of the surface, and covered with soil, which must afterwards be trodden firm. No manure should be placed in direct contact with the roots. Standards should be secured to stakes. After planting, the ground should be mulched with well-rotted, short manure. As a rule good watering may be given immediately after planting.

In spring the beds should be forked over lightly, and enriched with some well-decomposed manure. Suckers from stocks must be looked for and cut away. If large flowers are desired, some of the flower-buds should be removed. During a severe winter, or in very cold localities, the China, Noisette,

sary only to cut out the old worn-out shoots, and for others the whole of the shoots require to be more or less shortened annually.

Amongst the Bourbon Roses there is a vast difference in the growth of *Souvenir de la Malmaison* and *Mrs. Paul*, the first making shoots 1 to 2 feet long, whilst in the latter they sometimes grow to a length of 12 feet. And it is the same in other classes. The short growers, represented by *Mme Ravary* and *Laurette Messimy*, should be cut back as shown in fig. 107, leaving only the two or three lower eyes on each shoot. Such ordinary growers as *General Jacqueminot*, *Marie van Houtte*, and *Mrs. Bosanquet*, require to be pruned as shown in fig. 108. Teas and Noisettes do not

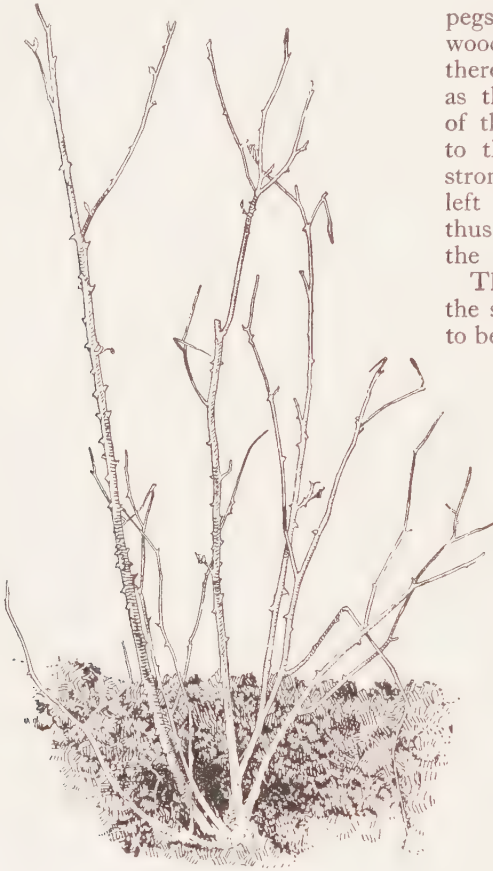
require this severe pruning, but the same principle should be followed for them. A third section, represented by Gloire de Dijon and Rêve d'Or, should be pruned as shown in fig. 109, by simply removing the unripened ends of the long shoots.

Summer pruning is sometimes desirable for strong growers, especially those used for beds, by removing growths that have

has been mild. It is useless to leave any unripened wood upon the plants, no matter to which section they may belong. Always cut back to a sound eye.

Pegged-down Roses.—This method consists in planting vigorous-growing dwarf Roses in lines or beds, far enough apart for the strong shoots of the previous year's growth to be bent down and kept about 1 foot to 18 inches from the ground by means of pegs. From nearly every eye flowering wood is formed, and masses of flower are thereby produced. In August, or as soon as the flower is past, the flowering wood of the previous summer is cut away close to the ground, and three or four of the strongest shoots of the summer's growth left for pegging down in February. Roses thus treated produce strong shoots from the base.

The time of pruning must be regulated by the season at which the plants are required to be in flower; for the earlier this operation



A Strong-growing Rose



The same, pruned

Fig. 107

bloomed, which would otherwise produce lateral shoots at the expense of the sucker-like shoots that will be pushing from the base. This admits of the thorough maturation of the wood to be left when the general pruning takes place.

The time to prune depends upon the class of Rose and the locality. March is good for Hybrid Teas, Hybrid Perpetuals, and all classes but Teas, Noisettes, and a few of the more tender sorts, which should be left until April. It is not often that the eyes start into growth early, unless the weather

is performed, the earlier will the flowers be produced, provided the wood is ripe. By pruning at various periods, and by forcing, Roses may be made to flower throughout the year.

Culture in Pots.—Roses for the decoration of the conservatory during the winter and spring are grown in pots. If plants growing out-of-doors are selected, they should be taken up in October or November, when the shoots are ripe, and, the roots having been pruned and the heads thinned, potted firmly in 6-, 8-, or 9-inch pots, according

to habit, in mellow turfy loam, leaf-mould, and well-decomposed dung in equal parts, adding a little sand. The pots should then be plunged up to the rims in coal-ashes or old tan; a layer of soot is a good preventive against the ingress of worms. Here they may remain all winter with only a layer of loose litter over the pots, but the delicate sorts ought to have the protection of a cold

will bloom throughout the winter. These forced plants should be hardened off in April and repotted in fresh soil; they may then be plunged out-of-doors.

Roses grown in pots require, as a rule, closer pruning than those planted in the open ground. The shoots must be tied out at an early stage of their growth, nipping off the flower-buds if not required. They should be syringed occasionally during the growing season, and green-fly, thrips, and other insect pests must be kept under by fumigation and careful spraying with insecticides. An occasional application of weak liquid manure will prove very beneficial to them. Draughts, or extremes in water-supply, are often the cause of mildew and the attacks of insect pests.

Propagation.—The Rose is propagated by seeds, cuttings, layers, suckers, buds, and grafts.

Seeds are sown usually with the object of obtaining improved varieties. When the flowers expand, if a cross is to be effected, the stamens of the female parent ought to be removed with tweezers, and, as soon as the pollen of the male parent is ripe, it should be applied to the stigma with a camel-hair pencil. A muslin protector ought to be placed about the flower to prevent interference from insects. When ripe, the seed-pods or hips should be gathered and placed in pots of earth or sand where they will be out of the way of mice, which would soon devour them. Early in March the seeds should be rubbed out of the hips, sown in pans or shallow boxes filled with loam and leaf-mould, placed in a cold frame, and kept moist. Some will germinate in the course of the spring, summer, or autumn following, others not until the succeeding year. When strong enough they should be drawn, their tap-roots shortened, and replanted from 6 inches to 1 foot apart, according to size. They must be protected from severe frosts. When the plants come into bloom, the most promising should be selected for further trial, until a correct opinion as to their merits can be formed.

Cuttings of partly matured growth may be struck at any time, but the most favourable time is about the end of September. A border of light soil on the north side of a hedge or wall should be devoted to them, and the cuttings be made 6 to 9 inches in length. The Bourbon, China, and Tea-scented sections require different treatment. In autumn, before the fall of the leaf, cuttings 4 inches long should be inserted



Rose first year of planting

The same, pruned

Fig. 108

frame; in spring they may be again plunged out-of-doors, where they may remain till October, when they should be placed in a temperature of 50° to 55° for flowering during the winter. If young own-root plants lately struck from cuttings are preferred, they should be shifted in spring into 5- or 6-inch pots, and plunged out-of-doors as already recommended. In July or August most of the plants will require to be shifted into 8- or 9-inch pots, and if removed in October to a pit, and later on to the Rose house, they

round the edges of 4-inch pots filled with a mixture of turfy loam, leaf-mould, and silver sand, and if placed in a frame they will be rooted by the following spring. Or the cuttings may be placed in a bed of light soil in cold frames. Where bottom-heat is available, the cuttings may consist of a single joint of well-ripened young wood.

Roses may also be propagated from eyes

they are then planted in nursery rows. When the buds start to grow in spring, they should be rubbed off, with the exception of two or three situated near the top. Brier stocks raised from seed are sometimes used for dwarf Roses. Most Roses when on this stock produce blooms of clear colour, and continue to flower for a long season.

The Celina stock is a good one for Bour-



Standard Rose, unpruned



Standard Rose, pruned

Fig. 109

by selecting buds of matured growth. This is an excellent plan for plants grown under glass. The cuts (fig. 110) explain themselves; all that is necessary being a gentle bottom heat and a close case for a few weeks.

Budding.—The sorts employed as stocks are the Celina, Boursault, Manetti, La Griferaie, *multiflora*, *laxa*, *rugosa*, and the Dog Rose. Plants two or three years old, free from side branches, are preferred. The tops are shortened to from 6 inches to 4 feet, according to the height at which they are to be budded, and the side branches removed;

bons and Noisettes; it may be readily propagated by cuttings.

The Manetti is an excellent stock for all free-growing Roses that require to be grafted. It is readily propagated from cuttings of mature shoots inserted early in October or November, according to season. Much the best plan is to cut them into lengths of 9 inches, carefully taking out all the eyes below the two at top, to prevent the after-growth of suckers. It is especially suited for light soils. When planting stocks for dwarf Roses, it is necessary to keep the crown of the roots near the surface so that

the bud can be inserted low down on the stem, thereby avoiding suckers.

Selecting the buds is important. In the case of climbers, it is best to take buds from a strong healthy shoot. The bud should also be in the best possible condition, and as nearly as can be in the same stage of growth as the stock. The illustration (fig. 111) shows a suitable shoot. The bud marked *a* is too forward, and should therefore be rejected; *b* is a bud in the best stage. This should be cut out with a sharp knife as shown at the bud marked *c*. Turn back the bark at bottom, and, seizing the tongue of wood between the point of the knife

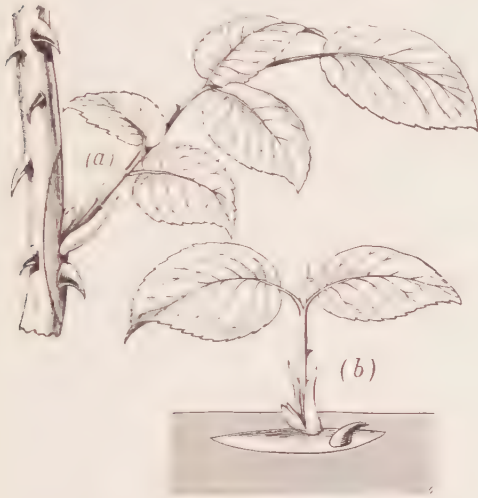


Fig. 110

(a) Bud suitable for cutting. (b) Mode of Planting.

and thumb, detach it with a slight jerk. If the bud is full at the base, it is in the right condition. This is important, as a complete union and full support from the foster-sap cannot otherwise be secured.

Standards should be budded when the new growths are about 3 feet in length and the bark close to the stem lifts easily. When force is necessary to raise the bark, the chances of a quick and perfect union are remote. Dwarf stocks are ready at any time while in active growth, and seldom cling in the way standard Roses do (fig. 112 represents a budded shoot on a standard Brier). It is advisable to plant out all stocks for Roses in rows, lifting and replanting them the second autumn after budding, planting them 1 foot apart in the rows, which should be 3 feet apart. Seedling Briers intended for dwarfs should not be stouter than a cedar pencil, and will soon

swell large enough for budding. All dwarf stocks should be planted shallow, and be earthed up afterwards in much the same way as Potatoes, so that when the earth is removed, previous to budding, the bark



Fig. 111

will lift more easily and with less liability to break.

It is desirable that the buds lie dormant until the end of the season after they have

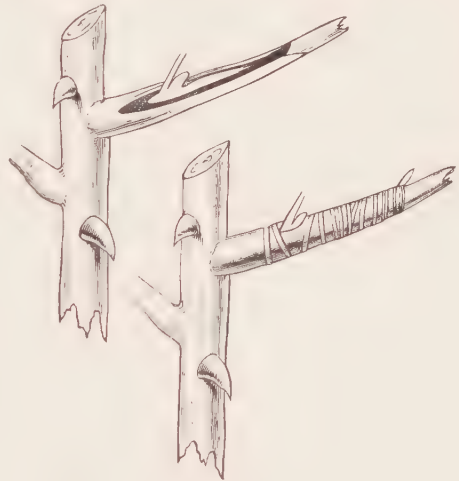


Fig. 112.—Budded Shoot on a Standard Brier

taken. The following spring, at pruning-time (but not before), cut the stock back to within 2 inches of the bud, when the whole strength and nourishment of the foster-roots will be thrown into the bud and future plant. The time to bud must be regulated according to the condition of the

growth from which the buds are to be obtained; but, as a general rule, July, August, and the first half of September are suitable.

Grafting.—Although budding is the



Fig. 113.—Side- or Whip-grafting

method usually employed for Roses, grafting also has its advantages. It is generally practised for the increase of pot Roses and tender varieties. Healthy and well-matured shoots should be selected, the best being from plants grown and ripened under glass. The stocks may be lifted from the open, and laid in light soil under cover for a few weeks to excite sap flow before being grafted and potted at once. This is much the easiest way. Fig. 113 illustrates side- or whip-grafting. A scion of ripened wood, about $2\frac{1}{2}$ inches in length, and having two or more eyes, is selected. This is cut as shown in fig. 113, which also represents the prepared stock. The cuts should correspond in every way, so as to admit of a perfect fit when placed together. All that now remains is to tie them together securely, and then pot and place the grafted stocks in a bottom-heat of 65° to 75° . They take and start into growth in about a week, and are soon ready to be hardened off. The second method of grafting (fig. 114) is employed when the stock is full of sap; also for green or growing wood of delicate varieties. In either method the sap should be active. Prepare the scion as in (a), not making one straight cut, as in the first

method, but cutting the scion so as to form a seat or rest (b). This is to rest upon the top of the stock (c) when cut off as near to the root as possible, and so as to allow of the scion being inserted beneath the raised bark (d), which should be lifted in the same manner as in budding. Slip the scion beneath the bark, and press it down until the seat (b) rests upon the top of the stock, and the whole resembles (e). Tie securely, and treat as in the first method described. It often occurs that suckers form upon the roots of stocks while under the influence of heat. These must be removed as soon as noticed.

Classification.—Botanists divide the genus *Rosa* into eleven groups, each typified by a species, i.e. *Banksianæ*, *Bracteatae*, *Caninæ*, &c. In gardens, however, this classification is unworkable, so many of the species having been crossed and recrossed. It has therefore become necessary to group Garden Roses according to their habit, time of flowering, fragrance, &c., under such names as Hybrid Perpetual, Hybrid Tea, Monthly, Moss, &c.

There are evidences of an increased interest in species of Roses, some of which are now in favour as garden plants. They are included in the article on HARDY TREES AND



Fig. 114.—Cleft-grafting

SHRUBS (Vol. IV, p. 97). Most of those described here are either hybrids or varieties.

SUMMER ROSES

PROVENCE ROSES.—The individuals composing this group owe their origin to *Rosa centifolia* (fig. 115), a native of the Caucasus. The old Provence or Cabbage Rose was well known in

this country previous to 1596. The flowers are generally of a globular shape, and being very odoriferous, are cultivated in the Levant for making rose-water. All the varieties are perfectly hardy and mostly of moderate or dwarf habit of growth, requiring rich soil and rather close pruning. They should be grown on their

heavily clothed with moss. Moss Roses grow best on their own roots; and in rich soil in a warm south-west aspect. They may be severely pruned.

Alice Leroy.—Lilac, shaded with rose, vigorous.

Celina.—Rosy-crimson, shaded purple, moderate grower.

Common or Old Crested.—Pale-rose, vigorous, first-rate.

Cristata.—A crested form of the common Moss.

Madame Edouard Ory.—Deep rosy-carmine, vigorous, and a perpetual bloomer.

Princess Alice.—Blush, pink centre, vigorous.

Quatre Saisons Blanche.—White, in clusters, vigorous.

Salet.—Bright-pink, perpetual.

Souper et Notting.—Deep-pink, large and globular, perpetual bloomer.

Unique.—Pure-white, large and full.

White Bath.—White, one of the best.

Zenobia.—Satiny-pink, large, good for pot culture.



Fig. 115.—*Rosa centifolia*

own roots. Amongst the best varieties of this group are:

Common or Cabbage.—Large, rosy-pink; vigorous.

Cristata or Crested.—Rose; calyx fringed, giving the buds a crested appearance.

Reine de Provence.—Large, lilac-blush; vigorous.

Striped Unique.—White, striped with lake, but apt to lose its striped character if planted in rich soil.

Unique, syn. *White Provence*.—Pure-white; flowers large and full.

MINIATURE PROVENCE, or POMPON ROSES, being of very low growth, are frequently planted as edgings to beds, or in small beds by themselves, and for pots.

De Meaux (Pompon).—Rosy-pink and lilac, a beautiful little Rose.

Dwarf Burgundy.—Very small, pale purplish-pink.

Little Gem.—Crimson, very mossy.

Æillet.—Rosy-pink, fringed.

Spong.—Small, pale rosy-lilac.

White Burgundy.—White, shaded pink.

MOSS ROSES.—Supposed to have originated as a sport from *R. centifolia* in 1596. In confirmation of this supposition, we often find the flowers of the Cabbage or Provence Rose with the calyx

DAMASK (*Rosa Damascena*) and FRENCH (*R. Gallica*, fig. 116) ROSES.—These so closely approach one another that they may be classed together. They are hardy, exceedingly sweet-scented and free-flowering. The old Red Damask is a self-red form of *Rosa Mundi*; the latter with Village Maid often being confused with the true form of York and Lancaster. They thrive in any garden soil, readily responding to generous treatment.

Boula de Nanteuil.—Crimson-purple.

Commandant Beaupaire.—Bright-pink, striped with purple, violet, and white.

Madame Hardy.—Large, white, vigorous.

Rosa Mundi.—Red, striped white, occasionally all red.

Village Maid.—White, striped with dull-red.

York and Lancaster.—Pale-flesh, striped with purple.

ALBA ROSES.—Obtained from *R. alba*, whose glossy leafage is characteristic of the group.

Blanche Belgique.—Free, white.

Celestial.—Light-blush, attractive bluish foliage.

Félicité.—Blush and rose.

Madame Legras.—White, creamy centre.

Maiden's Blush.—Soft blush, dark centre.

HYBRID CHINESE, BOURBON, and NOISSETTE ROSES.—These have sprung from the Provence and French, crossed with the Chinese, Bourbon, and Noisette Roses. They are vigorous, hardy, abundant bloomers, and are well adapted for standards or pillars. They require the shoots to be well thinned in autumn, and shortened a little in spring.

Blairii II.—Rosy-blush, good for wall or pillar.

Catherine Guillot.—Beautiful rosy-lilac, large.

Charles Lawson.—Vivid rose, large and double.

Chénédolé.—Large, light-crimson, good for pillar.

Coupe d'Hébé.—Deep-pink, vigorous.

Fulgens.—Bright-crimson, vigorous.

Junio.—Very large, pale-rose, vigorous.

Madame Plantier.—Pure-white, vigorous.

Paul Perras.—Large, pale-pink, good for pillar.

Paul Ricaut.—Rosy-crimson, vigorous.

Paul Verdier.—Light carmine-red, first-rate.

Vivid.—Crimson, a fine climbing Rose.

SCOTCH or BURNET ROSES.—These originated from *R. spinosissima* (fig. 117), a low spiny bush, indigenous to Britain, Europe, and Siberia. They produce an abundance of small globular flowers early in spring, even in poor soil. They are

Harrisoni.—Golden-yellow, free, semi-double.
Persian Yellow.—Large, deep-yellow, semi-double.

PERNETIANA ROSES.—These were named in



Fig. 116.—*Rosa Gallica*

suitable for forming low hedges. There are purple, red, blush, yellow, or white varieties. Three of the most noteworthy are *altaica*, 6 feet high, with white flowers; *hispida*, 6 feet high, with yellow flowers; and Stanwell Perpetual, clear pink, very fragrant.

honour of the raiser, M. Pernet-Ducher, of Lyons. By crossing Persian Yellow with Antoine Ducher, a hybrid Tea, he produced the first hybrid, Soleil d'Or, which was the parent of the Lyon Rose and other beautiful varieties. They have inherited some of the faults of the



Fig. 117.—*Rosa spinosissima* (var. *altaica*)

AUSTRIAN BRIER ROSES.—This group is descended from *R. lutea*, a yellow-flowered species, native of Italy, Germany, and the south of France. They are very hardy, succeeding best in a rather poor soil. The flowers being borne on the extremities of the shoots, very little pruning is needed; the head, however, must be thinned.

Austrian Copper.—Single, reddish-copper.

Austrian Yellow.—Bright-yellow, flowers single.

Austrian Brier, as they drop their foliage early and are susceptible to black spot.

The newer varieties show some improvement in this respect, and are likely to prove good bedding Roses. They are characterized by a rich coloration, a blending of red, orange, vermillion, pink, rose, and yellow.

Arthur R. Goodwin.—Coppery orange-red, passing to a salmon-pink.

Beauté de Lyon.—Coral-red, shaded yellow.

Constance.—Orange-yellow, streaked crimson.
Golden Emblem.—An improved Rayon d'Or.
Independence Day.—Apricot, tinted orange, flowers erect.

Juliet.—Outside of petals old gold, inside rich rosy-red.

Louise C. Breslau.—Coral-red buds shaded chrome-yellow, opening to pink, orange, and yellow, fine bedding Rose.

Lyon Rose.—Coral-red, chrome-yellow, and shrimp-red.

Mme E. Herriot.—Coral-red, shaded yellow and rosy-scarlet.

Rayon d'Or.—Coppery-orange, streaked scarlet, changing to cadmium-yellow.

Sceptre.—Flowers erect, conical bright-flame, shaded yellow.

Soleil d'Or.—Orange-yellow, shaded nasturtium-red.

BOURSAULT ROSES.—These owe their origin to *R. alpina*, a native of the Alps, Pyrenees, &c. They are very hardy, growing vigorously, and blooming freely, even in unfavourable situations. In pruning, the shoots ought to be thinned, and shortened a little.

Amadis.—Large, semi-double, deep-crimson.
Blush Boursault (De l'Isle).—Large, double, blush.

Elegans.—Semi-double, rosy-crimson.

Gracilis.—Full, rosy-red.

AYRSHIRE ROSES.—Bred from *R. capreolata*, a variety of *R. repens* (fig. 118), a British species, a trailing shrub with white flowers and small red globose hips; some are the result of crossing this and *R. indica*, &c. They grow freely, and are well adapted for covering walls, fences, banks, and pillars, as well as for cultivation as weepers.



Fig. 118.—*Rosa repens*

Souvenir de George Beckwith.—Shrimp-pink, tinted orange yellow.

The Queen Alexandra.—Vermilion, shaded old gold, a good doer.

Viscountess Enfield.—Coppery old-rose, shaded yellow.

Willowmere.—Rich shrimp-pink, shaded yellow.

SWEET BRIERS or EGLANTINE ROSES (*R. rubiginosa*), a native of Britain and Europe. Some beautiful hybrids were raised by the late Lord Penzance, by crossing the Sweet with Austrian and Persian Briers, Damask and Gallica Roses, &c. They grow with great vigour, flower profusely, and their colours are pleasing. They are effective in groups in large borders of flowering shrubs, or as fences or screens.

Amy Rohsart.—Deep-rose.

Anne of Geierstein.—Dark-crimson.

Brenda.—Blush, with bright-golden anthers.

Flora M' Ivor.—White, flushed with rose.

Green Mantle.—White, flushed with green; edges pink.

Jeannie Deans.—Semi-double, scarlet, in clusters.

Lady Penzance.—Coppery-red, Austrian Copper being one of its parents.

Lord Penzance.—Fawn, with yellow centre; from Sweet Brier and Harrisoni.

Lucy Bertram.—Deep-crimson, semi-double.

Meg Merrilees.—Deep-crimson, very free.

Rose Bradwardine.—Clear rose.

They require no pruning except to reduce them when overgrown.

Countess of Leven.—Creamy-white, semi-double.

Dundee Rambler.—Small, double, white.

Ruga.—Large, double, pale-flesh.

Splendens.—Large, semi-double, white, red margin.

Thoresbyana.—Small, double, white.

EVERGREEN ROSES.—Forms of *R. sempervirens*, a European species. They are only sub-evergreen, retaining their foliage till late in winter. They are hardy and very vigorous, producing their flowers in large clusters. They are fine pillar and weeping Roses. The shoots should be merely thinned in pruning.

Félicité Perpétué.—Cream-white.

Flora.—Pink, full.

Léopoldine d'Orléans.—White, shaded with rose.

Myrianthes Rénonculé.—Blush, rose margin.

Princesse Marie.—Reddish-pink.

Rampante.—Pure-white.

Russelliana.—Crimson.

Spectabile.—Large, rosy-lilac.

William's Evergreen.—Creamy-white.

MULTIFLORA ROSES.—There has been considerable confusion in this class, the fact being that it represents two totally distinct groups. *R. multiflora* is a vigorous-growing species from China and Japan, with large clusters of small white

single flowers not unlike those of the Bramble. This has been called *R. polyantha*, a name also given to a hybrid between it and *R. indica* (fig. 119), which has single white flowers sometimes 3 inches across. Still another set, known as *Polyantha*

Aglaia.—Bright-yellow.

Blush Rambler.—Soft-blush, large clusters.

Claire Jacquier.—Nankeen - yellow, strong grower.

Crimson Rambler.—Bright crimson.



Fig. 119.—*Rosa indica*

Perpetual Roses, is that which includes the Fairy or Miniature Roses. Thus, under the name of Multiflora Roses we have extremes in growth ranging from 1 to 15 feet; some being perpetual-blooming, others flowering only in early summer. Tall growers:

Dorothy Jeavons.—White sport from Blush Rambler.

Electra (fig. 120).—Lemon, shaded orange and white.

Euphrosine.—Pink, vigorous grower.

Evangeline.—White, tips of petals pink.



Fig. 120.—Rose—*Electra*

Helene.—Pink, shaded violet.
Kew Rambler (fig. 121).—Pink and white, very free.
Lenchtstern.—Rose, white eye.
Mrs. F. W. Flight.—Pink, with white centre.
Philadelphia Rambler.—Crimson.
Psyche.—Pale rosy-pink.
Rubin.—Bright ruby-red.
Tausendschon.—Pink, to rosy-carmine.

Anna Marie de Montravel.—White, free.
Canarienvogel.—Golden-yellow and orange.
Coral Cluster (fig. 122).—Coral pink, free, distinct.
Ellen Poulsen.—Bright cherry-rose.
Eblouissant.—Bright-crimson.
Jessie.—Bright-red, free, and flowering very late.
Katherine Zeimet.—Pure-white, in large clusters.
Leonie Lamesch.—Coppery-red, shaded yellow.



Fig. 121.—Rose—Kew Rambler

Thalia.—Pretty white clusters.
Veilchenbleau (Blue Rambler).—Lilac-rose, to bluish-purple.
Wallflower.—Rosy-crimson.

Dwarf-growers—shoots rarely exceeding 1½ feet. The Fairy Roses are included here. They are remarkable for their large trusses of blossom, produced in constant succession. There are many varieties which are used for bedding, being free and perpetual flowering. They are also excellent pot Roses, forcing well and flowering freely.

Mrs. Cutbush.—Pale-pink, free.
Orleans.—Brilliant red, suffused rose, very free.
Perle d'Or.—Nankeen-yellow, with orange centre.
Rodhatte.—Clear cherry-red, free.
Yvonne Rabier.—White, strong grower.

HYBRID CLIMBING ROSES.—The Roses forming this group are hybrids, some of the Musk Rose, others of *R. multiflora*. They are extremely vigorous, and bloom in great profusion.

Fortune's Yellow.—Orange-yellow, semi-double.
Madame d'Arblay.—Double, white.



Fig. 122.—Rose—Coral Cluster

Madame V. Morel.—Carmine-rose and cerise, small, in clusters.

The Garland.—Fawn and blush, changing to white.

between *R. Banksiæ* and *R. Fortuneana*. The former is the true double-white, produced in clusters, and with an exquisite violet perfume. *R. Fortuneana* (*Banksiæ alba*) is larger, the flowers are invariably produced singly and sparsely, while the foliage is shining and smooth upon both sides, and the peduncles extra bristly.

Alba.—Small, pure-white, very fragrant, in crowded clusters.

Fortuneana.—White, of large size, solitary.

Lutea (fig. 123).—Small, single, bright-yellow, in clusters, very free.

AUTUMNAL ROSES

MACARTNEY ROSES.—The varieties constituting this small group have been obtained from *R. bracteata*, an almost evergreen species, brought to this country from China by Lord Macartney. They are all rather tender, requiring the protection of a wall with a sunny aspect. The best are: *Alba Simplex*, white, single; *Maria Leonida*, white, blush centre, showy foliage; *Mermaid*, climbing with single sulphur-yellow flowers and deep amber stamens.

MUSK ROSES.—From *R. moschata* (fig. 124), Europe and China. They are remarkable for the musk-like odour of their flowers and long, somewhat rambling habit; suitable for training on pillars, &c., in warm situations, and against walls in cold ones, flowering abundantly in the autumn. They form good shrubs for the lawn, and are very effective in large lawn beds. Some of them are hybrids between *R. moschata* and *R. indica*.

Danæ.—Pale-yellow changing to white, strong grower.

Fig. 123.—*Rosa lutea*

BANKSIAN ROSES.—The origin of these is *R. Banksiæ*, a native of China. They grow vigorously, often 15 to 20 feet high, and bloom freely and early. Being rather tender they should have the protection of a wall with a south aspect and a warm dry soil. In pruning, it is merely necessary to thin out badly ripened shoots, and to take off the points of those left. There is confusion

Moonlight.—White flushed lemon, sweetly scented, strong grower.

Pax.—Pure-white, buds tinted lemon, strong grower.

Prosperity.—White, tinted pink in bud, strong grower.

Queen of Musks.—Small, pinky-white, climbing.

Rivers' Musk.—Pink, shaded buff, climbing.

Fig. 124.—*Rosa moschata*

Snowstorm.—Small, white, perpetual; forms a large bush.

The Garland.—Nankeen and pink, climbing.

Trier.—White, shaded pink.

PERPETUAL MOSS ROSES.—Obtained by crossing the Moss Rose with Hybrid Perpetuals. They are less mossy than the true Moss Rose. They require a rich soil and close pruning, flowering in summer and autumn.

Eugène de Savoie.—Bright-red, full.

Eugénie Guinoisseau.—Cherry-red to violet, large.

James Veitch.—Violet and crimson, large and double.

Madame Edouard Ory.—Bright-carmine.

Madame William Paul.—Bright-rose, large and full.

Perpetual White.—White, well-mossed, vigorous.

NOISSETTE ROSES.—Supposed hybrids between the Musk and the China Roses, introduced by M. Noisette, of Paris. Flowers in large clusters, produced throughout the season till late in autumn, succeeding either as standards or dwarfs. The strongest growers may also be grown as weepers or climbers, and need little pruning.

Aimée Vibert.—Pure-white.

Alister Stella Gray.—Deep-yellow, orange centre, in trusses, vigorous.

Bouquet d'Or.—Deep-yellow, large and full.

Caroline Kuster.—Bright orange-yellow, extra fine.

Céline Forestier.—Rich sulphur-yellow.

Cloth of Gold.—Yellow, pale margin, vigorous; requires a wall with a warm aspect.

Lamarque.—Large, yellow, vigorous, requires shelter.

L'Idéal.—Yellow and coppery-red, fragrant and free.

Maréchal Niel.—Bright golden-yellow, large and perfect form; a magnificent Rose for a wall or under glass.

Ophir.—Nankeen and copper.

Rêve d'Or.—Deep-yellow, very free, needs little pruning.

William Allen Richardson.—Orange-yellow and creamy-white, variable. Good on a wall.

CHINESE ROSES.—These have sprung from *R. indica*, a native of China, and introduced into this country in 1796. They are for the most part of dwarf habit, and being tolerably hardy, may, in the warmer parts of the kingdom, be planted in the open ground; but in cold localities the shelter of a wall is requisite, and in either case protection should be afforded in winter by spreading a layer of tan or litter over the roots, or by sticking evergreens, furze, or fern among the branches. *R. indica* has had a share in the origin of several classes, and has imparted to them its almost perpetual-blooming qualities.

Charlotte Klemm.—Fiery blood-red, shaded cinnabar.

Common Pink Monthly.—Pale-pink, very free.

Comtesse du Cayla.—Crimson-red, shaded orange and coppery-yellow.

Cramoisie Supérieure.—Velvety crimson, free.

Ducher.—Pure-white.

Fabvier.—Crimson-scarlet.

Felleberg.—Rosy-crimson.

Hermosa.—Pale-pink, very free.

Laurette Messimy.—Rose, shaded yellow.

Madame Eugène Resal.—Coppery-red, to bright rose.

Mrs. Bosanquet.—Delicate flesh.

Queen Mab.—Rosy-apricot, shaded orange and rose.

RUGOSA, AND ITS HYBRIDS.—A distinct race, remarkable for their leathery rugose leaves, large, cupped, fragrant flowers, and very showy hips. They need no protection, pruning, or high culture. In the shrubbery they are most pleasing; also as groups in parks, or to form hedges or cover. Excellent for planting in sandy soil near the sea. They flower continuously from June till late autumn, and the flowers are succeeded by clusters of large bright-scarlet hips.



Fig. 125.—H. P. Rose—Frau Karl Druschki

pink shades of the Damask with an extended time of flowering, and until the advent of the Hybrid Tea was the most popular group of garden Roses, there being, it is said, at one time some two thousand named varieties in cultivation.

Notwithstanding the great merits of the Hybrid Teas, the best of the Hybrid Perpetuals are still in favour, on account of their fragrance and their large, full, richly coloured flowers. Some of them, such as Victor Hugo and Mrs. J. Laing, are favourites for pot culture. Most of them are summer-flowering, but a few flower a second time



Fig. 126.—H. P. Rose—Mrs. Sharman Crawford

Alba.—Single, pure-white, sweetly scented.

Atropurpurea.—Blackish-crimson, opening to maroon.

Blanche Double de Coubert.—Pure-white, semi-double, one of the best.

Carmen.—Crimson-scarlet, very sweet.

Conrad F. Meyer.—Clear silvery-rose, like La France, sweetly scented.

Delicata.—Soft rose, sweet, and continuous bloomer.

Mrs. Anthony Waterer.—Deep-red, semi-double, highly perfumed.

Mrs. Georges Bruant.—Pure-white, semi-double.

Nova Zembla.—White sport from Conrad F. Meyer, very fragrant.

Repens alba.—Single, white.

Rose à parfum de L'Hay.—Brilliant-red, free and very sweetly scented.

Rutra.—Deep-rose, shaded violet.

HYBRID PERPETUAL ROSES.—The parents of this group are the Damask, Bengal, Chinese, Bourbon, and others. It combines the dark- and clear-

in autumn, and these at any rate should retain a place in the garden.

The following is a selection of the best sorts:

A. K. Williams.—Carmine-red.

Alfred Colomb.—Carmine-red, free.

Baroness Rothschild.—Light-pink.

Candeur Lyonnaise.—Lemon-white.

Captain Hayward.—Scarlet-crimson.

Duke of Edinburgh.—Bright velvety crimson.

Fisher Holmes.—Dark-crimson scarlet, free.

Frau K. Druschki (fig. 125).—Pure-white.

General Jacqueminot.—Scarlet-crimson, scented.

Gloire de Chedane Guinoisseau.—Vermilion-red, shaded velvety red.

Heinrich Schultheis.—Delicate pink, sweetly scented.

Horace Vernet.—Velvety red, shaded dark-crimson.

Jules Margottin.—Cherry-red.

Louis van Houtte.—Deep scarlet-crimson.

Madame Gabriel Luizet.—Silvery-pink, very free.



HYBRID TEA ROSE: Lady Pirrie



Fig. 127.—Hybrid Tea Rose—Colonel O. Fitzgerald

Marie Baumann.—Soft carmine-red.

Mrs. John Laing.—Soft pink, good for all purposes.

Mrs. S. Crawford (fig. 126).—Deep rosy-pink.

Paul Neyron.—Deep-rose, very large.

Prince C. de Rohan.—Dark velvety crimson.

Reynolds Hole.—Deep-maroon, flushed scarlet.

Suzanne Rodocanachi.—Rosy-cerise.

Ulrich Brunner.—Cherry-red.

Victor Hugo.—Crimson-red, with dark shading.

HYBRID TEA ROSES.—By far the most popular class of garden Roses, numbers of new seedlings being added every year. They have supplanted the Hybrid Perpetuals for bedding purposes, for which they are eminently suited, being free and truly perpetual-flowering. Many of them are superb exhibition Roses; others are most serviceable for cultivation in pots under glass. A few varieties are grown by the hundred thousand by market growers. The following is a selection of varieties:

Antoine Rivoire.—Rosy flesh.

British Queen.—Pure-white.

Caroline Testout.—Light salmon-pink, one of the best.

Colonel O. Fitzgerald (fig. 127).—Velvety crimson.

C. E. Shea.—Clear-pink.

Cherry Page.—Cerise-pink, fading to old rose.

Chrissie Mackellar.—Carmine and orange pink.

Countess of Warwick.—Lemon-yellow, edged pink.

Covent Garden.—Deep-crimson, shaded plum.

Dorothy Page Roberts.—Coppery-pink.

Duchess of Wellington.—Rich saffron-yellow.

Earl of Warwick.—Soft salmon-pink.

Ecarlate.—Brilliant scarlet-red, very free.

Florence Pemberton.—Creamy-white.

General Mac Arthur.—Bright scarlet-red.

George Dickson (fig. 128).—Velvety crimson, a grand Rose.

Golden Ophelia.—Golden-yellow.

Gorgeous.—Orange - yellow, veined orange-copper.

Gustave Grunnerwald.—Bright-carmine.

Henrietta.—Orange - crimson, changing to salmon.

Hoosier Beauty.—Crimson, with dark shading.

J. B. Clark.—Deep-scarlet, shaded crimson.

Joanna Bridge.—Straw-yellow, shaded red.

Joseph Hill.—Salmon-pink, shaded yellow.

K. of K.—Intense-scarlet.

La France.—Bright silvery-rose.

La Tosca.—Tinted rosy-white.

Lady Alice Stanley.—Deep-coral outside, inside flesh.

Lady Ashtown.—Deep-pink.

Lady Pirrie.—Coppery-salmon and apricot-yellow.

Liberty.—Bright-crimson, very free.

Lieutenant Chauré.—Velvety crimson.

Madame Abel Chatenay.—Carmine-rose, shaded salmon.

Madame Jules Grolez.—Silvery-rose.

Madame Leon Pain.—Silvery-white, yellow, and orange.

Madame Melanie Soupert.—Salmon-yellow, and carmine.

Madame Ravary.—Golden-yellow.

Madame Segond Weber.—Clear salmon-pink.

Margaret Dickson Hamill.—Straw - yellow, flushed carmine.



Fig. 128.—Hybrid Tea Rose—George Dickson

Marquis de Sinety.—Golden-yellow, shaded bronzy-red.

Mrs. A. R. Waddell.—Rosy-scarlet and reddish-salmon.

Mrs. Aron Ward.—Indian-yellow and salmon-rose.

Mrs. Dunlop Best.—Reddish-apricot.

Mrs. E. Powell.—Scarlet, shaded crimson.

Mrs. George Sawyer.—Clear rose-pink.

Mrs. Wemyss Quin.—Lemon-chrome, tinged orange-crimson.

National Emblem.—Dark-crimson.

Old Gold.—Reddish-orange, with coppery shading.

Ophelia.—Salmon-flesh, shaded rose.

Phariser.—Salmon-rose and rosy-white.

Prince Charming.—Deep reddish-copper.

Prince de Bulgarie.—Silvery-flesh, shaded salmon.

Queen Mary.—Canary-yellow, shaded lemon-chrome.

Radiance.—Carmine, shaded salmon red.

Red Letter Day.—Velvety scarlet-crimson.

Richmond.—Rich-scarlet.

Sallie.—Creamy-flesh, with splashes of yellow.

St. Helena.—Cream, pink, and yellow.

Verna Mackay.—Ivory-sulphur buff, changing to lemon.

Viscountess Folkestone.—Creamy-pink.

White Killarney.—White sport from Killarney.

White Ophelia.—A lovely white rose.

BOURBON ROSES.—The origin of these is not positively known; probably a hybrid between the Bengal and another. Although few of the older varieties, if we except *Armosa* and *Souvenir de la Malmaison*, are first-class, there are beautiful varieties among the newer ones. The vigorous growers are suitable for pillars, &c. A few of the best are:

Acidalie.—Blush-white, vigorous.

Armosa.—Deep-pink, free, compact.

Climbing Souvenir de la Malmaison.—A free-growing sport from the old favourite.

Gloire de Rosomanes.—Bright-crimson, semi-double.

Kronprinzessin Victoria.—A yellow-tinted dwarf sport from Malmaison.

Lorna Doone.—Magenta, shaded scarlet, very free.

Madame Isaac Pereire.—Light-carmine, large and full, a grand pillar Rose.

Mrs. Paul.—White, shaded soft-lilac, an immense grower.

Sir Joseph Paxton.—Rosy-crimson, early flowering, vigorous.

Souvenir de la Malmaison.—Clear-flesh, one of the best late Roses.

Zephyrine Drouhin.—Bright silvery-pink, thornless, very sweet scented.

TEA-SCENTED ROSES.—Of hybrid origin, *R. indica* being the principal parent. They are exceedingly useful, and many improvements, both in colour and shape of flower, have been made in recent years, so that most of the new varieties are more vigorous and hardy than the old. As a matter of fact, Tea Roses are not so tender as is supposed, but owing to their early and late period of growth their shoots are apt to be hurt by frost. Whether for pot culture or to train against the roof of a conservatory, on walls, fences, pergolas, or in beds, they are invaluable.

Their flowers are remarkable for delicacy of colour and elegance of form. Neither the Teas nor the Noisettes suffer from red-rust; they are also exceptional in that they bloom continuously from early summer until severe frost stops them. Many of them are exquisitely scented.

Dwarf-growers, 2 to 3 feet, suitable for beds on lawns and for pot culture:—

Alexander Hill Gray.—Deep lemon-yellow.

Anna Oliver.—Rosy-flesh and buff.

Bridesmaid.—Clear bright-pink.

Catherine Mermet.—Rosy-flesh.

Corallina.—Rosy-crimson, fine autumn bloomer.

G. Nabonand.—Pale-rose, shaded yellow.

Harry Kirk.—Deep sulphur-yellow.

Lady Hillingdon.—Orange-yellow.

Lady Roberts (fig. 129).—Apricot and coppery-red.

Madame Antoine Mari.—Soft rosy-pink.

Madame Falcot.—Deep-apricot.

Madame Hoste.—Pale lemon-yellow.

Madame Jean Dupuy.—Rosy-yellow, and creamy-white.

Madame Lambard.—Salmon, shaded rose.

Maman Cochet.—Light-pink, outer petals bright-rose.

Marie van Houtte.—Canary-yellow, tipped bright-rose.

Molly Sharman Crawford.—Dazzling white.

Mrs. Edward Mawley.—Shaded salmon.

Mrs. Foley Hobbs.—Ivory-white, tinted pink.

Mrs. Herbert Stevens (fig. 130).—White, shaded peach.

Souvenir de Pierre Notting.—Apricot, flushed coppery-yellow.

Titania.—Coppery-crimson, changing to coppery-red.

White Maman Cochet.—Creamy-white, tinted blush.

W. R. Smith.—Creamy-white, flushed rosy-pink.

Vigorous growers, 5 feet or more. Useful as climbers under glass or against walls in the open.

Belle Lyonnaise.—Pale canary-yellow.

Climbing Devoniensis.—Creamy-white, free, tender.

Climbing Niphetos.—Pure-white, shoots 10 to 20 feet.

Climbing Perle des Jardins.—Straw-yellow, vigorous.

Gloire de Dijon.—Buff, pale-orange centre.

Madame Bérard.—Buff and apricot, strong grower.

HYBRID NOISETTES.—This small class includes a few exceedingly valuable varieties, such as:

Baronne de Maynard.—Pure-white.

Boule de Neige.—White, very hardy, a good grower.

Coquette des Blanches.—Pure-white, small.

Madame Alfred Carrière.—White, yellow base, free.

Reine Olga de Wurtemberg.—Light-crimson, a grand climber, handsome foliage.

WICHURAIANA ROSES.—The introduction of *R. Wichuraiana* provided a valuable species for hybridizing, the result being that we now have a large number of sorts invaluable for clothing rough slopes, bold rock work, and for training on arches and pergolas; they also make excellent



Fig. 129.—Tea Rose—Lady Roberts



Fig. 130.—Tea Rose—Mrs. Herbert Stevens



Fig. 131.—Weeping Wichuraiana Rose

weeping standards (fig. 131). Many of them are suitable for pot culture, quickly growing into large specimens. Their glossy, evergreen foliage is proof against mildew, except those in the breeding of which *R. multiflora* has been used as the other parent.

When planted to cover banks and such like positions they require no pruning, except the occasional removal of the old shoots. When used on pergolas and arches, they should be pruned after flowering, cutting out entirely all the old wood that can be spared.

American Pillar.—Single, rose-pink, borne in large clusters.

Alberic Barbier.—Creamy-white, shaded yellow.



Fig. 132.—Single Rose—Irish Elegance

Chatillon.—Shell-pink, with golden anthers.

Dorothy Perkins.—Shell-pink, late-flowering.

Emily Gray.—Flowers yellow, almost like Madame Ravary; fine glossy foliage.

Excelsa.—Bright-scarlet, double flowers.

François Juranville.—Double rose-coloured flowers, a rampant grower; fine for pergolas.

Gardenia.—Yellow, opening to cream.

Hiawatha.—Single, deep-crimson, shading to white in the centre.

Jersey Beauty.—Pale-yellow, very free.

Lady Godiva.—Soft, pale flesh-pink.

Léontine Gervais.—Salmon and rose.

Paul's Scarlet Climber.—Vivid-scarlet, shaded crimson.

Sander's White.—The finest White Rambler.

Source d'Or.—Large, golden-yellow.

SINGLE ROSES.—In recent years single Roses have become popular as garden plants. Many

of them are free and perpetual-flowering, and may therefore be used as bedding Roses.

Irish Afterglow.—Tangerine, passing to pink.

Irish Beauty.—Pure-white, flowers in clusters, fragrant.

Irish Elegance (fig. 132).—Bronzy-orange, exquisitely shaded.

Irish Fireflame.—Fiery-orange crimson.

Isobel.—Carmine-red, flushed orange-scarlet, with copper shading at the base of the petals, a fine bedder, free and flowering very late.

Mrs. C. E. Salmon.—Soft salmon-pink, suffused orange.

Mrs. A. T. Kingsmill.—Shell-pink.

Princess Mary.—Deep crimson-scarlet, free.

Queen of the Belgians.—Rich salmon-pink.

Rosalie Wrench.—Bright-pink.

Ulster Volunteer.—Cherry-red, early and late flowering.

Waltham Scarlet.—Crimson-scarlet, free.

Roses suitable for Pot Culture

Lady Hillingdon, Lady Pirrie, Lady Roberts, Liberty, Lieut. Chaure, Mine Abel Chatenay, Molly Sharman Crawford, Mrs. Geo. Shawyer, Mrs. Herbert Stevens, Mrs. John Laing, Ophelia, Richmond.

Roses for Exhibition

Alexander Hill Gray, Caroline Testout, Dean Hole, Frau K. Druschki, Melaine Soupert, Molly Sharman Crawford, Mrs. Foley Hobbs, Mrs. Geo. Shawyer, Mrs. John Laing, Mrs. W. J. Grant, Ulrich Brunner, White Maman Cochet.

Roses for Specimen Plants

American Pillar, Blush Rambler, Dorothy Perkins, Ellen Poulsen, Excelsa, Hiawatha, Jessie, Lady Godiva, Minnehaha, Mrs. F. W. Flight, Mrs. W. H. Cutbush, Orleans Rose.

Roses for Greenhouse Climbers

All the climbing varieties of the following: Caroline Testout, Lady Ashtown, Lady Hillingdon, Lamarque, Liberty, Melaine Soupert, Mrs. W. J. Grant, Richmond, also Fortune's Yellow, Maréchal Niel, and William Allen Richardson.

Roses for Massing in Beds

Caroline Testout, Cherry Page, Earl of Warwick, Ecarlate, General Mac Arthur, Hugh Dickson, Isobel, Jessie, Joanna Bridge, Katherine Zeimet, K. of K., La France, La Tosca, Lady Alice Stanley, Lady Pirrie, Lieut. Chaure, Louise-Catherine Breslau, Los Angeles, Mme Abel Chatenay, Mme E. Herriot, Mrs. W. H. Cutbush, Mrs. E. Powell, Mrs. John Laing, Ophelia, Orleans Rose, Pharisaer, Princess Mary, Red Letter Day, St. Helena, Viscountess Folkestone.

Roses for Pegging Down

Beauté de Lyon, Billard et Barre, Duke of Edinburgh, Frau K. Druschki, Gloire de Dijon, Gustave Regis, Gruss an Teplitz, Hugh Dickson, J. B. Clark, Lady Waterlow, Ulrich Brunner, William Allen Richardson.

Roses for training on Pillars

Albérie Barbier, American Pillar, Ards Rover, Blush Rambler, Carmine Pillar. All the climbing varieties of the following: Aimée Vibert, Mme Melaine Soupert, Richmond, Capt. Christy, Caroline Testout, La France, Papa Gontier, also Emily Gray, Florence H. Veitch, Gustave Regis, Gruss an Teplitz, Hugh Dickson, J. B. Clark, Lady Waterlow, Léontine Gervais, René André, Sarah Bernhardt, Shower of Gold, Zephyrine Drouhin.

Roses for Screens, Arches, and Pergolas

American Pillar, Albérie Barbier, Bennett's Seedling, Crimson Rambler, Dorothy Perkins, Excelsa, François Juranville, Helene, Hiawatha, Lady Godiva, Madame Alfred Carrière, Mrs. F. W. Flight, Minnehaha, Miss Hellyett, Sander's White, Silver Moon, The Garland, Tea Rambler.

Roses for high Walls and Fences

The climbing forms of Devoniensis, Perle des Jardins, Niphetos and Captain Christy; Mme Bérard, the White and Yellow Bankians, Reine M. Henriette, Belle Lyonnaise, Céline Forestier, L'Idéal, Ophir, Rêve d'Or, William A. Richardson, Maréchal Niel, Mme A. Carrière, Reine Olga de Wurtemberg, Rosa Bracteata, and Gloire de Dijon.

Sarracenia.—The Side-saddle Flowers or North American Pitcher-plants are worth a place among popular garden plants. They are easy to cultivate in a greenhouse, and they are of exceptional interest, both in the structure and functions of their trumpet-like leaves, and in the large size and singular form of their flowers. There are six species, all North American, and from these numerous hybrids have been raised. In the warmer parts of England some of them may be grown in a sheltered, moist, sunny situation out-of-doors, but the best results are obtained when the plants are grown under glass. *Sarracenia*s are essentially swamp or marsh plants. They like an open, porous compost, free of lime, and plenty of water all through the spring and summer; in short they should never be allowed to get dry. They grow well and flower freely under the following treatment: The plants are wintered in a cold house or frame, a few degrees of frost doing them no harm. In March they show signs of active growth by pushing up flower-buds, and as soon as these appear, the plants should be repotted. This should be done thoroughly, by shaking the roots free of all old soil, cutting away the decayed and useless old parts of the rhizomes, removing all old leaves, and planting them in well-drained pots or pans in a mixture of fibrous peat,

sphagnum, charcoal, and silver sand, setting them rather close together if a good specimen plant is desired. They should then be placed in a sunny position in a greenhouse where they can be kept close in sunny weather. The secret of success is simply to allow the temperature about the plants to run up to 80° or even 90° with sun-heat, keeping the soil saturated and the atmosphere moist; the temperature may fall quite low during the night without fear of injury. The best plants have been grown in a house where artificial heat was never used, but where the sun sometimes raised the temperature to 90°. Bright light, a high temperature, and plenty of moisture are the chief factors in the production of large, richly marked pitchers.

The flowers precede the new leaves, and sometimes the plants are weakened by over floriferousness; each rhizome should therefore be limited to one flower. After the pitchers have matured, by the end of June say, the temperature and conditions of an ordinary greenhouse are suitable, plus plenty of water at the roots; a heavy watering every day, sometimes oftener, will be found agreeable to them.

S. Chelsoni (purplea × rubra).—Pitchers 1 foot long, broad, as in *S. purplea*, almost erect, and coloured a rich claret-purple. Flowers 4 inches across; purplish-brown.

S. Courti (purplea × psittacina).—Pitchers 8 inches long, coloured deep-crimson.

S. Drummondii has erect trumpet-shaped pitchers 2 feet or more long, the lid broad and wavy, the upper part white with reddish and green veins; flowers 4 inches in diameter, maroon-coloured, the stigma greenish-red; one of the most beautiful.

S. flava.—Pitchers up to 3 feet in length, erect, green, the veins red, the upright lid yellowish; flowers large, canary-yellow. The varieties, *ornata* and *atrosanguinea*, are improvements on the type, the former being very large and wide-mouthed in the pitcher; *atrosanguinea* is remarkable for the deep-red of its veins and lid.

S. formosa (psittacina × variolaris).—Pitchers 6 inches high and coloured green, with reddish spots and veins.

S. melanorrhoda (purplea × Stevensi).—Pitchers 6 inches long with a deep wing; colour rich blood-red.

S. Patersoni (purplea × flava).—There is little difference between this and *S. Stevensi*.

S. Popei (flava × rubra).—Remarkable because of its flowers, which are 4 inches across, and coloured rich velvety crimson, with yellow margins, and pink inside the petals.

S. psittacina.—A small plant with horizontal pitchers, with a broad wing, a hood-like lid, and the apex twisted like a parrot's head.

S. purplea has short horn-shaped, inflated pitchers of a deep blood-colour, the flap-like lid upright. A plant in a 10-inch pot may have thirty large crimson pitchers.



Fig. 133.—*Sarracenia*

S. rubra.—Pitchers erect, 2 feet high, with a pointed, inflexed lid; green with red veins on the upper part; flowers 3 inches across, red-brown.

S. Stevensi (*purpurea* × *flava*).—One of the finest, pitchers 2 feet long, erect, green, with reticulations of brown-red. Flowers 6 inches across, the sepals green, the petals crimson outside, cream-coloured within, and the style, which is 3 inches across, bright-green.

S. variolaris has pitchers 1 foot high, with a broad wing and a hood-like lid; they are green with a little yellow mottling about the mouth. The flowers are large and pale-primrose coloured.

sometimes a yard long and half a yard wide, from the base of which the flowers are produced on crowded erect panicles, quite a sheaf of them; the flowers are $1\frac{1}{2}$ inches long and brick-red in colour. *S. Rexii* has numerous small leaves and slender scapes of one or two bluish flowers. The hybrids and their offspring vary in colour from white to crimson and deep-blue, and many of them have flowers as large as Gloxinias. Most of the seedlings, all perhaps except the red-flowered, come true from seeds.



Fig. 134.—A White Streptocarpus

S. Williamsi (*purpurea* × *flava*).—Pitchers shorter than in *S. Stevensi*; flowers 5 inches across, coloured red-brown on the sepals, rosy-lilac on the long petals, the large disc of the style being green.

Other good hybrids with characters partaking more or less of both parents are: *S. Swaniana* (*purpurea* × *variolaris*), *S. Wrigleyana* (*psittacina* × *Drummondii*), *S. Tolliana* and *S. Wilsoniana* (*purpurea* × *flava*); *S. Mitchelliana* (*Drummondii* × *purpurea*), *S. excellens* (*Drummondii* × *variolaris*), *S. Maddisoniana*, *S. Mooreana* (*Drummondii* × *flava*).

Streptocarpus.—A race of useful greenhouse plants of hybrid origin, the parents being chiefly *S. Rexii* and *S. Dunnii*, both African plants. The hybrids are easy to cultivate, and have decidedly attractive flowers. *S. Dunnii* has only one large leaf,

With regard to red, the colour obtained from *S. Dunnii*, the seedlings show a tendency to lose that colour, and it is probable that to maintain it among the garden races of the genus, *S. Dunnii* must be occasionally used as a breeder.

The cultivation of Streptocarpaceae presents no difficulties. They may be grown as stove plants along with Gloxinias, or in a frame or greenhouse with Pelargoniums and tuberous Begonias. Although they are perennials, the best results are obtained when they are treated as biennials, raising a fresh stock annually from seeds sown in February. If grown as greenhouse plants the same course may be followed as is known to succeed in the case of tuberous Begonias. They are admirably adapted for

planting in beds or rockeries under glass, and they thrive in shaded positions where many plants would fail for want of light. From seeds sown in February good plants, well flowered, are possible by the following August, and these will flower freely and continuously all through the autumn and winter. Exceptionally good varieties may be perpetuated by means of leaf-cuttings planted in coco-nut fibre in a propagating frame, but as a rule plenty of seeds are



Fig. 135.—Sweet Pea—Mrs. Tom Jones

ripened on the plants. Any ordinary garden soil may be used for them. If grown in pots, a 5-inch is sufficient for each plant, but nice specimens can be made by planting four or six plants in a 8- or 10-inch pot or pan.

The worst insect pest is the Begonia mite, which is difficult to exterminate if once it gets established on the leaves. Several applications during the season of Campbell's Sulphur Vaporizer will entirely remove this pest. Bug also attacks them, usually on the under side of the leaves; it must be watched for, and the usual remedies applied.

Sweet Pea (*Lathyrus odoratus*) (fig. 135).—The Sweet Pea is a most popular hardy annual. It is said to have been introduced

from Sicily in 1700, but it is within the last forty years that the best varieties have been raised. About thirty years ago, Mr. Henry Eckford obtained seedlings with new colours. New varieties have also been raised in the United States, so that now the number is very large. For cut-flower purposes the Sweet Pea has scarcely a rival. A dwarf type, known as *The Cupid*, originated in the United States a few years ago, and varieties of it appear annually. Perhaps the most important advance has been by the production of the Spencer Sweet Peas, which are characterized by waved margins. They were originated by Mr. Silas Cole, gardener to Earl Spencer, and were first exhibited in 1901.

A race of winter-flowering Sweet Peas, when sown in pots in August, may be had in flower at Christmas.

The Sweet Pea may be grown in any garden soil, but a deep and rather heavy loam gives the best results. The soil should be deeply dug and manured in the autumn. Early sowing is important. If the seeds are sown in drills they should be prepared as for ordinary garden Peas, scattering them thinly and evenly, and covering them with 2 inches of soil. As the plants grow, the soil should be drawn about the stems. If the seeds are sown in pots, six seeds in each pot will be sufficient. They can then be planted out to form a bush with the aid of pea-sticks in well-manured soil. The best results are obtained by sowing the seeds in boxes or pots in January, February, or early March, planting out in well-prepared soil in April, giving plenty of room, never less than 12 inches apart, if the soil is specially good. Some growers prefer to sow the seeds in autumn where the plants are to flower, but slugs and other evils are apt to interfere. Soaking the seeds for a few hours in water before sowing hastens germination. Those varieties with lighter-coloured seeds, such as *Blanche Burpee* and *Emily Henderson*, both white-flowered, and *Mrs. Eckford* and *Primrose*, primrose-coloured, are more liable to rot in the soil than the black or dark-brown seeds. It is not advisable to grow Sweet Peas on the same ground two years in succession. Other annual forms of *Lathyrus* deserving a place in the garden are the *Blue Pea*, a form of *L. sativus*, having a lovely shade of blue, but which soon fades under sunshine; and *L. tingitanus*, the *Tangier Pea*, which bears large crimson and maroon flowers.

Tulip.—Of this showy genus there are

about seventy species distributed in Europe, North Africa, Western and Central Asia, as far east as Japan. The Tulip was introduced from Turkey to Vienna, and thence to Holland, about the year 1560, where their beauty and variety of colouring soon gave them popularity which culminated in the historical craze, the Tulipomania, when very large sums were paid for the rarest varieties.

In 1597 they had become equally popular in England.

Early or bedding Tulips are believed to have originated from *T. suaveolens*, while the late, or May-flowering kinds, are the



Fig 136.—*Tulipa Gesneriana* (var. *Keizerkroon*)

offspring of *T. Gesneriana* (fig. 136). All the florists' Tulips are seedling variations of the last-named, which was probably one of the first Tulips introduced into European gardens.

Cultivation.—Tulips, both species and hybrids, are easily grown, a deep, rich soil suiting them best. In Holland they prefer a stronger and more loamy soil than the Hyacinth, but at Rush, near Dublin, they grow very vigorously in the deep moist sand near the seashore. As a rule they are not exacting, and thrive well in any good loamy soil, living for years undisturbed in cottage and farmhouse gardens. Still it is as well to lift the bulbs when their leaves turn yellow, say in June, every two or three years, or the clumps become crowded and flower weak. The bulbs may be dried and cleaned in an open, airy shed, and then stored in open-work boxes or shelves, until

planting-time, which may vary from August until November, the sooner the better, especially on cold, wet soils. The bulbs may be sorted into firsts and seconds, for blooming, and spawn for stock.

The species that are grown in gardens are:

T. acuminata.—Has long thin petals, and is not showy. Syn. *T. cornuta*.

T. Albertii.—Dwarf, with undulate, prostrate leaves. Flowers red, with a blotch of yellow edged with black on each petal. Turkestan.

T. altaica.—Yellow or red. Segments oblong acute. No basal blotch. 6 to 12 inches high. Central Asia.

T. Aucheriana.—Mauve or lilac. Stamens hairy at the base, 4 to 8 inches high. Persia.

T. australis.—Known from *T. sylvestris* by its funnel-shaped perianth, yellow flushed red on the outside, and its more slender habit. Savoy. Syns. *T. Breymiana* and *T. Celsiana*.

T. Batalini.—Dwarf and exquisite species, with pale-yellow, fawn, or apricot-hued flowers. Leaves narrow, undulate, prostrate.

T. Biebersteiniana.—Near *T. sylvestris*, but smaller and more slender. Siberia and Asia Minor.

T. biflora.—Flowers creamy-white, with a yellow eye, two or more on a scape. Caucasus.

T. Borszczowi.—Bright-red, with a black basal blotch, margined with yellow; there is a yellow form without any basal blotch. Central Asia.

T. brachystemon (fig. 137).—Dwarf, with yellow flowers, segments acute, leaves narrow, two in number. Turkestan.

T. Clusiana.—An elegant variable species. Flowers white, striped red, with a purplish centre. Mediterranean region; introduced in 1636; one of our oldest Tulips.

T. Didieri.—Deep-red, with black blotch, edged yellow or white. There are also yellow and white forms. Alps.

T. Eichleri.—Like *T. Greigii*, but leaves unspotted and flowers more cup-like, rich crimson, eye large, black-purple margined with yellow. Georgia.

T. elegans.—Bright-red, with yellow base. Perhaps a hybrid of *T. suaveolens* × *T. acuminata*.

T. Fosteriana.—Flowers rich crimson, with dark eye-like blotch. Early. One of the showiest.

T. Gesneriana.—The best and most variable of all Tulips. Type crimson-red, with a blue base. Grows 2 to 3 feet high. Var. *fulgens* is of a more intense colour, yellow at base, with pointed segments.

T. Greigi.—Vivid orange-scarlet flowers of great size. Leaves blotched with purple. Very variable and showy. Turkestan. There is a white variety.

T. Hoogiana.—Stem 12 inches high, leaves 8 inches long; flowers large, scarlet, with a black eye-like blotch. A grand Tulip. Bukhara.

T. humilis.—A dwarf species from Persia, closely allied to *T. australis*.

T. Kaufmanniana (fig. 138).—Bright-yellow; no basal blotch. Large and showy. Central Asia.

T. linifolia.—Dwarf, with narrow sprawling leaves; flowers large spreading, crimson, with black-purple eye; stamens purple. A beautiful rockery plant. Turkestan.

T. macrospila.—Leaves erect, blue-green. Flowers vivid, crimson-red, with blackish basal



Fig. 137.—*Tulipa brachystemon*



Fig. 138.—*Tulipa Kaufmanniana*

spot edged with yellow. One of the best garden Tulips. Supposed hybrid.

T. oculus solis.—Apricot-red, with dark blotch. Very showy. South France.

T. persica.—Dwarf, late-flowering, with coppery buds and bright-yellow flowers, often two to three on a stem. A pretty little plant. Persia.

T. platystigma.—Supposed to be the parent of Parrot Tulips, which revert to the type when allowed to remain long in the same place. High Alps.

T. præcox.—More robust and earlier flowering than *T. oculus solis*. Italy.

T. præstans.—Leaves and stems hairy; flowers with pointed segments, large, light-scarlet, with yellow base.

T. retroflexa.—Primrose-yellow; three segments reflexed with age. Supposed hybrid between *T. Gesneriana* and *T. acuminata*.

T. suaveolens.—Fragrant, early-flowering. Flowers red and yellow, on downy peduncles. South Europe. A parent of the early-flowering Dutch Tulips.

T. sylvestris.—Flowers yellow, filaments hairy at the base. Very sweet-scented; grows well in grass. Britain and Europe.

T. triphylla.—Bright lemon-yellow, greenish outside. Flowers in March. Central Asia.

T. turkestanica.—Near *T. biflora*. Flowers yellow, often three to four on a stalk. Early and showy. Turkestan.

T. Wilsoniana.—Leaves red-margined; flowers large, bright-scarlet, without basal blotch. Persia.

BEST GARDEN TULIPS

Single Early-flowering.—Artus (scarlet), Belle Alliance (scarlet), Bride of Haarlem (white and yellow striped vars.), Brutus (carmine), Canary-bird (yellow), Cottage Maid (rose and white), Couleur Cardinal (crimson-red), Crimson King, Duc van Thol (red and yellow)—of this there are scarlet, rose, red, yellow, striped, white, violet, and other variations, Duchess de Parna (orange-red and yellow), Fred Moore (deep-orange, edged with yellow), Keizerkroon (red, bordered with yellow), Joost van Vondel (red and white, also pure-white), La Reine (rose-white), L'Immaculé (white), Mon Trésor (yellow), Ophir d'Or (gold), Pottebakker (white, yellow, and scarlet vars.), Prince of Austria (orange-red), Princess Hélène (pure-white), Proserpine (carmine-rose), Queen of the Netherlands (pink and white), Queen Victoria (white), Rembrandt (scarlet), Rose Gris de Lin (white and rose), Thomas Moore (brown-red), Verboom (scarlet), Vermilion Brilliant, White Swan, Wouwerman (violet-red), Yellow Prince.

Double-flowered.—Blanche Native (white), Couronne d'Or (yellow), Couronne des Roses (rose and white), Duc van Thol (red and yellow, scarlet, and violet vars.), Duke of York (carmine and white), Fluweelen Mantel (Velvet Gem) (dark carmine), Gloria Solis (brown, yellow-bordered), Imperator Rubrorum (scarlet), La Candeur (white), Murillo (blush), Queen Victoria (carmine), Rex Rubrorum (scarlet), Safrano (rose and yellow), Salvator Rosa (dark rose), Toreador (red-brown and orange), Tournsol (red and yellow forms), William III (orange-scarlet), new.

Double-flowered, Late.—Blue Flag (violet), Belle Alliance (violet-red and white-striped), Mariage de ma Fille (crimson and white), Pæony Gold

(red, or red and gold striped), Yellow Rose (yellow).

Parrot.—Admiral of Constantinople (red), Lutea Major (yellow), Perfecta (scarlet and yellow), Cramoisie Brilliant (crimson), Coffee Colour, Fire King (brown), Crimson Beauty (blood-crimson), Large Yellow, Perfecta (golden-yellow).

Darwin Tulips.—Antony Roozen (blush rose), Baronne de la Tonnaye (silvery-rose, white centre), Clara Butt (soft-rose), Donders (crimson, violet centre), Dream (rosy-mauve, heliotrope ground), Edmee (crimson-rose, margined silver), Electra (purplish-rose, bordered white), Erguste (dark-heliotrope, silvery shading), Europe (cochineal-red, white centre), Farncombe Sanders (geranium-scarlet, tinged rose), Faust (dark-purple), Frans Hals (violet-purple), Glow (scarlet), Harry Veitch (blood-red), King Harold (blood-red), La Tulipe Noire (maroon-black), Loveliness (rose, white centre), Madame Krelage (rose-carmine, white margin), Margaret (fig. 140) (shell-pink, shaded cream), Massachusetts (rose, shaded bronze), Mauve Claire (lilac-mauve), Mrs. Potter Palmer (crimson), Nora Ware (silvery-heliotrope, shaded rose and white), Pride of Haarlem (cochineal-carmine), Professor Francis Darwin (rich-scarlet), Psyche (rose, with silvery margin), Remembrance (heliotrope, shaded rose), Rev. H. Ewbank (fig. 142) (soft-heliotrope, shaded grey), Salmon King (cochineal-rose, shaded salmon), Sophrosyne (soft-rose, silvery margin), Suzon (soft-rose, shaded blush-white), Sweet Lavender (soft-lavender, good for pots), The Sultan (glossy maroon-black), Viola (violet-purple), White Queen (white, tinted blush), William Pitt (ruby-rose, plum-red shading), Zulu (dark-purple).

Rembrandt Tulips (May-flowering) (fig. 141).—These are Darwin Tulips which have broken into permanent variegation.

The flowers are beautifully striped and blotched, and their quaint colouring is very effective when planted in large masses in mixed varieties. A few of the best are:

Anna Maria, Caracalla, Crimson Beauty, Ellen, Eros, Harold, Marco Spado, Quasimodo, Semele, Sirene.

Cottage Tulips.—Amber Crown (lilac-rose, flushed amber), Bouton d'Or (golden-yellow), Caledonia (vermilion-red), Columbus (golden-yellow, blotched scarlet), Cygnet (snow-white), Ellen Willmot (pale-primrose), Golden Crown (yellow, edged and flushed orange-red), Inglescombe (scarlet), Inglescombe (pink), Inglescombe (white) (fig. 139), Inglescombe (yellow), La Merveille (old-rose, flushed buff), Le Rêve (soft-rose, shaded orange), Lucifer (cherry-red), Macropsila (crimson), Moonlight (pale-primrose), Mrs. Moon (canary-yellow), Orange King (orange, shaded scarlet and rose), Parisian Yellow (clear-yellow), Picotée (white, margined rose), Scarlet Emperor (glowing-scarlet), Parisian White (white, changing to pink), The Fawn (fawn, shaded rose and white), Walter T. Ware (deep golden-yellow).

English Tulips.—When raised from seed these Tulips first bloom as "breeders" or self-coloured flowers, and are in that state often very beautiful, but they may at any time become "broken" or "rectified", which means that they produce striped or varie-



Fig. 139.—Tulip—Inglescombe White



Fig. 140.—Darwin Tulip—Margaret



Fig. 141 —Rembrandt Tulips



Fig. 142.—Darwin Tulip—Rev. H. Ewbank

gated flowers. All florists' Tulips must have a pure and clean white or yellow circular base to flower on which the dark anthers show up conspicuously. The old growers planted each bulb separately, in beds 12 inches apart, four or five in a row across the bed, and when they bloomed, or before, a light canvas awning protected them from wind, hail, or rain. The bulbs were lifted every year and stored in pigeon-holed boxes or drawers, each known under a separate number, the numbers and corresponding names being kept in a book for the purpose.

These Tulips are divided into four groups, viz. *Sels* or breeders, *Bizarres*, *Byblæmens*, and *Roses*. In *Bizarres* the colours are red, chestnut, or maroon, on a yellow base or ground colour. The *Byblæmens* are various shades of purple, shading to almost black, on a white ground colour; and in the *Roses* the colours are rose, deep-red, or scarlet, the base again being white.

A feathered Tulip has the colour finely pencilled around the margins of the petals and sepals. In a flamed variety the streaks or flames of colour extend from the margin towards the base of the flower.

The following is a list of a dozen of the best English Tulips:

Annie Mc'Gregor, Ashmole's Seedling, Bessie, Chancellor, Duchess of Sutherland, Dr. Hardy, Goldfinder, Elizabeth Pegg, Mrs. Collier, Mrs. Barlow, Sir Joseph Paxton, Sam Barlow.

Vallota purpurea (fig. 143), the Scarborough Lily, a native of South Africa, is not unlike a *Hippeastrum* in bulb and leaves, and has bright-scarlet flowers, 4 inches across, in umbels of from three to seven on stout scapes 18 inches high. The bulbs should be potted firmly in a mixture of good fibrous loam, leaf-soil, and sand in well-drained pots, and grown in a greenhouse or sunny frame. They are very successfully grown in cottagers' windows in districts near the sea. After they are established they should not be disturbed at the root for several years, both growth and flowers being better if the pot is well filled with roots. Offsets are produced freely by established bulbs, and these are the means of increasing the stock. They should be pricked off in pans in which they can remain for two years, and then removed to pots, several bulbs being placed in each. A rest should be given in winter by keeping the soil on the dry side, but they should never be dried off. After growth commences in March, liquid manure should be

given frequently until the flowers appear, which occurs usually in August. There are several named varieties, viz. *magnifica*, with flowers larger and brighter coloured than the type: *major*, with large deeper-coloured flowers; *eximeia*, remarkable in having flowers of a magenta shade with a conspicuous white eye; and *carnea*, with rosy-red flowers. A hybrid between *V. purpurea* and *Cyrtanthus sanguineus* has been raised in gardens, and is known as *Cyranthus hybridus*.



Fig. 143.—*Vallota purpurea*

Viola.—Under this heading are included the Show and Fancy Pansies, and the smaller-bedding Violas, or Tufted Pansies, now so much employed for garden decoration. It is only in special cases that varieties of Pansies and Violas are named and propagated by division or by cuttings, but they are very largely treated as annuals, and a supply maintained by successive sowings.

The Show Pansy, so long cultivated by florists for exhibition purposes, is divided into three sections, viz. *Yellow-grounds*, having a dense dark blotch round the eye, encircled by an irregular zone of yellow, and then a margin or belting of some shade of bronze, crimson, purple, or maroon; *White-grounds*, having a white ground, with more purple or violet in the marginal markings; and *Sels*, which may be white, cream, primrose, yellow, or black. Show Pansies are but little grown in the south; the

summers are too hot and dry for them; but they flourish in the north, and especially in Scotland. They have been largely supplanted by the larger-flowered race.

SHOW PANSIES

Self colours.—Alexander Scott, Allan Primrose, Bella Wilson, Gem, Harry Paul, Isabel, Major-General Stewart, May Stuart, Maud Stewart, Mrs. Currie, Primrose, Thomas Ritchie.

Yellow ground.—Bushy Gem, Eminence, Evelyn, James Christie, Ladysmith, Robert M. Wenley.

White ground.—Annie Steel, Constance, Mary Stewart, Maggie Ritchie, Mrs. John Stewart, Mrs. Sharp.

A variety known as the Belgian Pansy gave rise to a race now known as Fancy Pansies. This race is characterized by large flowers, with heavy blotches and striking colours. They were first mentioned in horticultural papers about the year 1850, and soon afterwards they were taken in hand by several Scots florists, to whose efforts the splendid race of large richly coloured Pansies is largely due. The plants are more robust than the show varieties, and support heat and drought much better. They do well in a deep gritty soil, enriched with plenty of leaf-mould. They breed fairly true from seed, and maintain a high quality of bloom, but the higher the quality the less seed they produce. They are generally treated as annuals.

Special varieties are propagated by cuttings of the young shoots placed in early summer in a bed of sandy soil under the shade of a wall or hedge, and covered with a hand-light or small frame. When rooted they are planted in nursery beds; they flower in the following spring and summer. If the plants, after they have flowered, are top-dressed with an inch or so of fine potting soil, the young growths root into it, and they may be separated in autumn.

Seeds sown as soon as they are ripe yield plants which bloom in late autumn and again in spring. Sown in August and September, the plants thus raised bloom in May, June, and July. A sowing made in March gives a succession of plants to flower in early autumn. They may be sown in a prepared bed, or in a box of light sandy soil in a cold frame, shading when necessary. When large enough to handle, the seedlings should be pricked off into other boxes or beds in a frame, where they may remain till March, and then planted

either in borders or prepared beds. They do best in soil which has been enriched during the autumn with manure—cow- or short horse-manure. By preventing seeding—that is, by picking off all flowers as they begin to decay—a long succession of bloom can be kept up. If the plants are attacked by green or brown fly, two or three syringings with a solution of soft soap (2 ounces to the gallon) will kill them. A top-dressing of sifted old manure or leaf-soil during May or early June is a capital stimulant, and works wonders in sustaining summer bloom.

FANCY PANSIES

Adam Black, Anetta, Alex. L. Duncan, A. R. Searle, D. K. Michie, David Chaplin, George Reynolds, Grace Forbes, James P. Robertson, James Tully, J. G. Weston, Maggie Alan, Mrs. A. Brodie, Mrs. J. G. Weston, Mrs. Eustace Smith, Mrs. J. M'Leod, Mrs. M'Kerchar, Mrs. W. Craik, Robert Johnstone, Ross Oliver, Salome, Wm. Craik, W. H. Phillips, Walter Ballantyne.



Fig. 144.—Fancy Pansy

The Bedding Viola or Tufted Pansy forms a race of compact-growing, free-blooming Pansies, longer-lived than the large-flowered race, and better able to support hot dry seasons. They are said to have originated from two species of *Viola*, namely, *V. cornuta*, which has blue flowers, and *V. lutea*. They began to appear about 1850,

Fig. 145.—*Viola*—*Bethea*

when the variety known as Magpie (*La Pie*) was introduced from France. By 1863 there were numerous varieties. In the seventies the Royal Horticultural Society got together, at Chiswick, a collection of all the varieties known. Since then Bedding *Violas* have grown in popularity. They are largely used for spring and early summer bedding, and, being perennial, they are of greater value than Pansies. They are propagated from cuttings exactly as Pansies are. They are also raised from seeds, but they do not breed true to type.

The following selection of sorts suitable for bedding is compiled from the reports on the most recent trials of *Violas*.

Yellow.—A. J. Rowberry, Bullion, Kingcup, Molly Pope, Primrose Dame, Sulphurea.

White Bethea (fig. 145).—Christiana, Palmer's White, Pencaitland, Seagull, Snowflake, White Swan.

Mauve and Lilac.—Bridegroom, Duchess of Sutherland, Florizel, John Quarton, Mauve Queen, William Neil.

Blue.—Blue Bell, Blue Duchess, Blue Rock, Maggie Mott (fig. 146), Royal Scot, True Blue.

Purple.—Arabella, Archie Grant, Countess of Kintore, Edina, Ivanhoe, Jubilee.

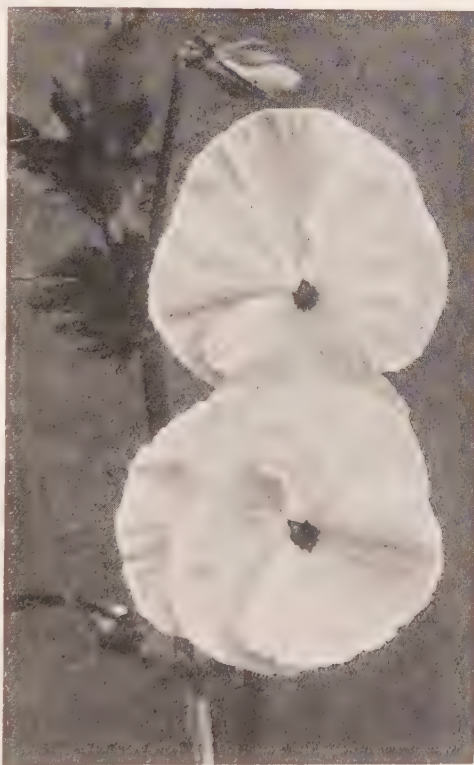
Various colours.—Blue Cloud (sulphur-white, edged blue), Crimson Bedder (deep reddish-purple), Duchess of Fife (chrome-yellow, edged bluish-violet), J. B. Riding (purplish-mauve), Mrs. Chichester (sulphur-white, edged violet blue), W. P. A. Smyth (creamy-white, edged bluish-violet).

Violetta (small-flowered).—Blue Bonnet, Gold

Crest, Modesty, Nelly M. Brown, Queen of the Year, *Violetta*.

Exhibition varieties.—Agnes Kay, George C. Murray, Hugh Reid, Kate Cochrane, Lady Knox, Mad. A. Gray, Madge Craig, Moseley Perfection, Mrs. Chichester, Mrs. C. M'Phail, Nellie Chapman, Rose Noble.

Violet (*Viola odorata*).—Violets can be grown in almost any soil and situation, but in order to produce special results, first-rate soil and cultivation are necessary. With these, and a good selection of varieties, a supply of flowers may be had throughout the autumn, winter, and spring. Although easily managed in some gardens, in others they are not satisfactory. It is therefore necessary to find out by experiment what particular treatment as to position and soil will be most successful. In a light sandy soil, on a border facing north, Violets usually grow well. In a deep loamy soil on a west or east border they also do well; and on stony loam, inclined to clay, a south border suits them. Success depends, however, not so much on soil or aspect as on treatment. To obtain large, good flowers in winter it is indispensable to begin with young healthy plants

Fig. 146.—*Viola*—*Maggie Mott*

every year. Old plants will never produce first-rate blooms, no matter how well they are cultivated.

Cultivation in Frames. — Where space is limited, frame cultivation is perhaps the most satisfactory, for although the Violet is perfectly hardy, and, when wild, flowers in spring, heated frames are necessary during the damp and often frosty days of winter,



Fig. 147.—Violet—Mrs. Lloyd George

to ensure a constant supply of flowers. Early in spring cuttings formed of the small side-shoots from the flowering crowns should be planted in a frame or hand-light in a mixture of loam, leaf-mould, and sand, keeping them close until they are well rooted, when air should be given freely, leaving the lights off altogether in mild weather. When rooted they can be left in the frames until July.

During summer, the plants require to be freely watered, and the side-shoots removed to induce the formation of plump crowns.

Frames that have been used for early vegetables are useful for planting out Violets to flower in autumn and winter. Plant them in light rich soil, near the glass, airing freely, except when there is frost. Keep the plants clean, stir the soil frequently, and give little water during the winter. They dislike fog, and for that reason they are not easy to manage in or near a large town. In spring, they may be lifted, divided, and replanted to make large plants by autumn.

The weather has a great deal to do with the success of Violets. Those planted on a south border will always do best in a damp season, and those on a west or north border when the conditions are hot and dry. Should red spider at any time appear, dust the plants over with lime and soot, and repeat the operation until the plants are free from this pest. For cultivation in pots, young plants should be potted singly in 60's, or four plants in 32's. Violets may be advantageously grown in the open on raised beds, shaped in the form of a steep ridge, and planted on both sides. They are sometimes attacked by a fungoid disease which causes dry, whitish spots on the leaves, often proving troublesome when the plants are grown under glass. Spraying with dilute Bordeaux mixture is recommended as a cure. Badly infested plants should be burnt. Cuttings should be taken only from perfectly healthy plants.

SELECT VARIETIES

Double

De Parme.—Pale-violet, early, very free.

Lady Hume Campbell.—Late, darker than Marie Louise.

Marie Louise.—Mauve-blue, with a white eye.

Mrs. J. J. Astor.—Reddish-pink.

Mrs. Lloyd George (fig. 147).—Large, deep violet, white eye-like centre. Very distinct.

Neapolitan.—Lavender, white eye.

Swanley White (Compte de Brazza).—The best double white.

Single

Admiral Avellan.—Reddish coloured.

Baronne A. de Rothschild.—Large, purple.

La France.—Large, violet-purple.

Princess of Wales.—Large and free, purple.

Victoria Regina.—Very free, small foliage.

White Czar.—White, but not constant, some flowers coming blue.

GREENHOUSE AND CONSERVATORY

I. THE GREENHOUSE

A greenhouse is a glass-roofed structure devoted to the cultivation of plants that require protection from extremes of weather. In England the term is limited to houses in which the temperature is regulated by means of ventilators and shading, except in cold weather, when artificial heat is employed to keep up a temperature a few degrees above freezing-point. The plants usually grown in such a house are known as greenhouse plants, as distinguished from stove plants, &c. A greenhouse as here defined is limited to a structure devoted to such plants as Pelargoniums, Fuchsias, Camellias, Cape Heaths, Bouvardias, Boronias, &c. As a rule they are plants that thrive only when provided with all the light possible, except when there is danger of sun-scorching.

Span-roofed greenhouses are the best for general purposes. Their height must be in a measure determined by their width. In houses devoted to the growth of greenhouse plants there is little internal moisture, consequently there is not likely to be much drip through condensation of vapour upon the glass and sash-bars, which is often troublesome in houses where there is much moisture, unless the roof has sufficient pitch to cause the water so condensed to run down the bars.

In all cases these span-roofed plant structures should stand at right angles to the south, so that all the light during the best part of the day is available, whereas if they stand in the opposite direction—that is, at right angles to the west—the plants are in shadow during the greater part of the day in winter.

In addition to the side-lights being made to open, it is necessary to provide for roof ventilation. To secure this there is nothing more simple or effectual than a hinged light on each side the ridge, about 2 feet in depth, worked with the usual lever and screw gearing; this allows air to be given even in wet

weather, and at whichever side is most favourable.

Air.—Plants grown under glass do not receive nearly so much fresh air as they get in the open. Much has been written on the principles of ventilation for planthouses, and yet nothing is more common than to see them treated in respect of air in a way that renders all other attention futile, it being either withheld at times when it should be admitted freely, or given in routine fashion from a certain hour in the morning to a given time in the evening, regardless of the state of the weather or season. Air can always be admitted on the side opposite to the direction from which the wind blows. The quantity of air thus admitted must be regulated more by the condition of the plants than by the temperature of the air, either within the house or externally. The temperature of a greenhouse in spring, when plants are making fresh growth, may be allowed to rise a few degrees higher than the normal. Later in the season, as the young growth becomes solidified and ripened, more air will be required in the day, as well as at night; but never, even when the wood and leaves are fully matured, should the plants be subjected to cold draughts.

Temperature.—The variety of plants usually grown in a single greenhouse cannot be provided with any special conditions which in nature they would enjoy, and this is particularly true in regard to temperature. Many greenhouse plants are not perceptibly injured by a degree or two of frost. On the other hand, many are seriously injured by being excited into premature growth when the other conditions are unfavourable. To prevent this a lower temperature may be needed, and the night temperature during winter for a general collection of greenhouse plants should be from 40° to 45°, or even 35° to 40°. The temperature during the day should be correspondingly low.

Watering.—This is a most important operation in the cultivation of plants in pots. A deficient or superabundant supply of water causes the death of more pot plants than all other causes put together. It is of all matters connected with plant culture the most difficult to explain. Only by patient observation of the requirements of each particular species can the necessary knowledge be obtained. It may be taken as a rule that the finer the roots possessed by any plant the more impatient it will be of a deficiency or excess of water. On the other hand, thick, strong-rooted plants are generally able to support these extremes. Greenhouse plants of all kinds, when they receive water at all, require sufficient to thoroughly moisten the whole of the soil. Many hard-wooded plants are killed by a single mistake in watering. The condition of the soil should be studied, also the condition of the plant, whether it be in vigorous growth or comparatively at rest.

Soils.—The principal of these are: *peat*, both bracken and heather used for hard-wooded plants; *loam*, from that which contains a quantity of the roots of grasses, and is freer and more open in its texture, to that which is more adhesive and clay-like; *leaf-mould*, used largely for soft-wooded plants; *sand* and *manure*. The best time to

lay in a stock of these is about July or August. Both peat and loam should be stacked in the open, not in a dry shed, as they are difficult to work when dust-dry. The soil when used should contain sufficient moisture to cause the particles to adhere when pressed. Loam procured from a common or an old pasture that produces a thick, close sward is, as a rule, the best. Sand should be clean and gritty.

Open-air Treatment.—The majority of greenhouse plants are benefited by exposure in the open air for a few weeks after they have completed their growth, say from the last week in July to the first in September. This gives ample time for ripening the growth before winter. In the case of delicate-rooted plants, especially those of a hard-wooded nature, the pots should be protected from the action of the sun, as the roots lie thickly against the inner surface of the pot, and if the full force of the sun comes upon it injury may result. The pots should therefore be partly plunged in ashes. Heavy rain may prove harmful, or a spell of dull wet weather. The simple expedient of laying the plants on their sides will prevent this. To prevent the stopping of the holes at the bottom of the pots by worm-castings, a layer of finely-sifted ashes should be placed where the pots are to stand.

II. THE CONSERVATORY

The conservatory, to be enjoyable at all seasons, and particularly in winter, should be so situated as to be contiguous to, if not directly connected with, the mansion, by means of a corridor, and so constructed and embellished as to form an enjoyable promenade in all weathers. At the same time it must be admitted that the cultural requirements of the plants are not easily provided in many conservatories, which are often dark, heavy structures, designed by architects who know nothing of horticulture, and wholly unsuited for the cultivation of plants.

It may be difficult to combine in one structure the requirements of both architect and gardener, but at least the necessities of plant life should be so far met, that the building may not be a vegetable charnel-house. Either a south, south-east, or south-west aspect is the most desirable, on account of light, especially in winter, when plants require all the light possible.

Another point which is by no means un-

important is to guard against the near proximity of large trees which would obstruct direct light and sunshine. Shelter on the north and north-east sides is desirable as a protection from the bitter, cutting winds, and this should be provided by distant plantations. Should the position be too much shaded for flowering plants, it will be advisable to furnish the house with Ferns, Cordylines, Palms, and other plants able to support such conditions.

To supply artificial heat the hot-water pipes must be judiciously placed. If the sides of the house are furnished with stone benches or iron shelves, the pipes can be hidden from view by placing them beneath these, otherwise they may be concealed in chambers underneath the pathways, and covered by cast-iron gratings, through which the heat may freely pass upwards into the house. There should be sufficient pipes to supply a temperature of 50° or 60° during winter, without overheating. As conservatories are kept furnished during winter with

a mixed assortment of plants, including those in flower, it is necessary to maintain a temperature between 45° as a minimum and 55° as a maximum. Shading may be necessary during summer, and for this roller-blinds are much the best.

If the central portion of the house is to be planted, it may be advisable to provide for drainage by means of drain-pipes, over which 8 or 10 inches of coarse brick rubble or clinkers may be placed, and over these a layer of fibry turf, grass-side downwards. The space left for soil should average about 2 feet in depth. The soil should be chopped coarsely as it is put into the bed.

In furnishing the house with plants, especially such as are to be permanent features, it is important to have regard to the conditions as to light and heat. It is necessary to avoid crowding, and to leave spaces for plants in pots. This secures a frequent change in effect, and gives an opportunity of introducing flowering plants in their season, most of which can be more successfully grown in other houses and when at their best removed into the conservatory.

If side-stages are provided, these are easily furnished with the plants in pots brought in when in flower.

Foremost among the plants suitable to form the principal features in a conservatory must be placed the hardier Palms, i.e. *Chamærops Fortunei*, *C. humilis*, *Phoenix reclinata*, *Kentia sapida*, *K. Fosteriana*, *Corypha australis*, and *Areca Baueri*. Particulars as to habit, stem, and temperature required by the several species will be found in the chapter devoted specially to these plants.

Some of the Cycads are also suitable for the conservatory, such being *Cycas revoluta*, *Dioon edule*, *Encephalartos Altensteinii*, *E. villosus*, *E. horridus*, and *Macrozamia spiralis*.

The forms of *Cordyline australis*, popularly known as Dracænas, are most suitable for isolated planting. *Aralia Sieboldii* and *A. papyrifera* are also suitable, and when grown well they attain large dimensions and flower freely. Also *Panax longissimum*, *P. crassifolium*, and *P. trifoliatum*. Agave, Dasy-lirion, Beaucarnea, Yucca, Musa, Araucaria, Acacia, Aspidistra, Bambusa, Phormium, Doryanthes are other genera which may be made to contribute to the beauty and interest of the large conservatory.

The stately grandeur of the arboreal Ferns

renders them particularly suitable for a large conservatory. Those available for this purpose are:

<i>Alsophila aspera.</i>	<i>Dicksonia antarctica.</i>
„ <i>australis.</i>	„ <i>arborescens.</i>
„ <i>excelsa.</i>	„ <i>fibrosa.</i>
„ <i>procera.</i>	„ <i>Lathamii.</i>
„ <i>robusta.</i>	„ <i>squarrosa.</i>
<i>Cyathea dealbata.</i>	„ <i>Youngiæ.</i>
„ <i>Dregei.</i>	<i>Hemitelia Smithii.</i>
„ <i>gracilis.</i>	„ <i>capensis.</i>
„ <i>medullaris.</i>	

As Tree-Ferns do not require a large amount of root space, they are most serviceable when grown in pots and placed in position, in preference to their being planted out.

Flowering plants that can be advantageously planted out in a large conservatory are few. Himalayan Rhododendrons are suitable, also *Luculia gratissima*, a plant that is somewhat impatient of root restriction, but which is quite at home planted out in a mild temperature. Camellias, Acacias, Pittosporums, *Daphne odora*, *Clethra arborea*, and *Datura suaveolens* are suitable.

Climbing plants should be freely used. Foremost amongst them stands the lovely *Lapageria rosea* and its white variety. *Tacsonia Van Volxemii* is of rapid growth, and produces a profusion of rich crimson blooms. *T. ignea*, *T. exoniensis*, and *T. insignis*, *Passiflora Bellottii*, *P. cærulea*, *P. Impératrice Eugénie*, are all free-growing and showy. *Trachelospermum* (*Rhynchospermum*) *jasmynoides*, *Jasminum grandiflorum*, *A. Riceana*, *Bignonia Cherere*, *Clematis indivisa*, *Lonicera Hildebrandii*, *L. semperflorens*, *Mandevilla suaveolens*, *Habrothamnus elegans*, *Hoya carnosa*, Maréchal Niel and Gloire de Dijon Roses, *Plumbago capensis*, *Cobæa scandens*, Tropæolums, and numerous other plants are good conservatory climbers. It would be a mistake to plant coarse-growing things to obstruct the light. Neither should a preponderance of deciduous plants be used.

Suspended wire-baskets are admirably adapted for the display of many plants such as Achimenes, Pelargoniums, Begonias, Tropæolums, Fuchsias, Asparagus, &c. Also Ferns, such as, for example, the Davallias with creeping rhizomes, Lygodium, Nephrolepis, Acrostichum, Adiantum, *Asplenium flabellifolium*, and *A. longissimum*. Some of the Selaginellas do well as basket-plants, especially *S. cæsia* and *S. Willdenovii*. Plants grown in baskets thus suspended require an abundant supply of water.

LIST OF GREENHOUSE PLANTS

ABUTILON.—A shrubby genus of the Mallow family with pendulous, bell-shaped flowers. They are of easy culture, flowering freely when grown in pots or planted out and trained to pillars or rafters, or grown as bushes. Cuttings. Loam and peat.

A. Darwini has large palmatifid leaves and orange-red flowers with dark veins. Brazil. There are numerous garden hybrids, of which *Boule de Neige*, white; *Boule d'Or*, yellow; *Eclipse* and *Fire Fly*, red; *Golden Fleece*, yellow; and *King of the Roses*, rose, are among the best.

A. megapotamicum variegatum has small leaves, mottled green and yellow, and red and yellow flowers 2 inches long. *A. vitifolium* has handsome leaves five- to seven-lobed, and blue flowers. Chili.



Fig. 148.—*Acacia cultriformis*

ACACIA.—About four hundred species are known, many of them Australian and known as Wattles. Some form bushes a yard or so high, others are large trees. The phyllodes or false leaves vary from mere spines to leaf-like structures 6 or 8 inches long by 2 inches wide. The flowers are in small fluffy balls, in racemes or panicles. Peat and loam. They flower from Christmas onwards. After flowering they must be well pruned. Some species are useful for clothing pillars.

A. armata. Small spiny leaves, fragrant flowers; forces well.

A. Baileyana. Glaucous, pinnate leaves, deep-yellow flowers.

A. cultriformis (fig. 148). Oval, glaucous leaves; a pretty pot plant.

A. dealbata (Silver Wattle, Mimosa). Large tree, glaucous, bipinnate leaves, yellow flowers in large, branching racemes. Grown largely in France for market.

A. Drummondii. Bush; pinnate leaves, lemon-coloured flowers.

A. hastulata. Small spiny leaves, pale-yellow flowers, crowded on scandent shoots a yard long.

A. leprosa. Scandent, suitable for pillars; very free.

A. longifolia. Strong bush, upright racemes; very free.

A. nerifolia. Long narrow leaves, pale-yellow flowers.

A. obliqua (ovata). Oblique leaves, small flowers; one of the best for pots.

A. platyptera. Winged stems, deep-yellow flowers.

A. pubescens. Tree; bipinnate leaves. Primrose-scented flowers.

A. pulchella. Pinnate leaves, yellow flowers, in solitary heads.

A. retinodes. Scandent shoots; good for pillars.

A. Riceana. An elegant plant with small needle-like leaves and pale flowers; good for pillars.

A. urophylla. A free-growing plant, with white flowers.

A. verniciflua. Small leaves and flowers; very free.

A. verticillata. One of the best for large houses. Linear, spine-tipped leaves, pale-yellow flowers in short racemes.

AGAPANTHUS.—Well-known, easily-grown plants, with strap-shaped leaves and large umbels of blue or white flowers on tall erect stems. South Africa.

A. umbellatus has leaves 2 to 3 feet long, and blue flowers. The best varieties are: *albus*, white; *excelsus*, blue, very robust; *flore pleno*, double blue; *variegatus*, small leaves, green and white; *Mooreana*, dwarf, with narrow foliage.

AGAPETES.—*Vaccinium*-like evergreen shrubs from Northern India. Flowers borne on parts of the plant several years old. Cool, airy house. Sandy peat. Cuttings.

A. buxifolia. A bushy shrub, with ovate leaves and scarlet tubular flowers 1 inch long. Fruit white.

A. macrantha (Thibaudia). Leaves 3 inches long, flowers large, five-angled, white with wavy red lines. Scandent habit.

A. setigera. Red flowers in small racemes.

A. variegata (pulcherrima). Leaves leathery, ovate, flowers in dense racemes, red, tipped white. Scandent habit.

AGATHÆA CÆLESTIS has blue Daisy-like heads of flowers an inch across, popularly called the Blue Marguerite. Cuttings any time. Loam. South Africa.

AGATHOSMA.—Heath-like shrubs from South Africa. Several species are in cultivation, the most common being *A. imbricata*, with small crowded leaves and flat terminal heads of light-purple flowers. There is a variety with white flowers. Cool, airy greenhouse. Cuttings. Sandy peat.

ALONSOA INCISIFOLIA, a Chilean plant with small scarlet flowers in terminal racemes and small finely-cut leaves 1½ feet high. Soft-wooded. Loam and leaf-mould. Seeds.

ARALIA.—Trees or shrubs with simple or compound leaves. Loam and peat. Seeds, cuttings, or grafts.

A. crassifolia. Simple or trifoliate leaves. New Zealand.

A. peltata. Large deeply-lobed leaves, 15 inches across.

A. reticulata (Meryta Denhami). A single-stemmed plant with a head of large oblong leaves. New Caledonia.

ARAUCARIA.—The indoor species merely require protection from frost. Cuttings of terminal growths from cut-back plants. Loam and peat.

A. Bidwillii (Bunya-Bunya Pine). Tree, with dark, leathery, sharp-pointed leaves and round cones the size of a man's head. Moreton Bay.

A. excelsa (Norfolk Island Pine). Tree, of elegant plumose habit, largely grown for decoration. The most distinct varieties are *compacta* and *glauca*.

A. Rulei. Leaves larger and thicker than in *A. excelsa*.

ARAUJIA.—Climbing Asclepiads from South America, of which *A. sericifera* (*Physianthus albens*), a strong twining plant with white flowers nearly an inch across, and *A. grandiflora*, with larger hairy leaves and Stephanotis-like flowers, are useful for the greenhouse. Loam and peat.

ARCTOTIS.—Shrubby composites with bold pinnate foliage and large Marigold-like flowers. Easy to cultivate. Very ornamental. Loam. South Africa.

ASPARAGUS.—Bushy or climbing, deciduous or evergreen plants, invaluable for floral decorations or as decorative pot or basket plants. The berry-like fruits of several are ornamental. *A. falcatus* and *A. umbellatus* are worth growing for their flowers. Loam and peat. Seeds, division, or cuttings. The following are African.

A. crispus. Dwarf, with slender twisted stems and inflated fruits.

A. falcatus. Stems 30 feet long, armed with stout prickles; leaves 2 inches long. Good for pillars.

A. medeoloides (*Myrsiphyllum asparagoides*). "Smilax". A climbing plant with ovate leaves. Useful for cutting.

A. plumosus. An elegant, useful plant. Var. *nanus* has flat, frond-like branches, and is largely grown for market.

A. Sprengeri. Small deep-green leaves, red fruit. Good basket plant.

A. umbellatus. Shoots 20 feet long; olive-green leaves an inch long, and bearing in autumn umbels of starry-white flowers.

ASYSTASIA BELLA.—Deciduous shrub, 4 feet. Ovate, dark-green shiny leaves and racemes of mauve flowers. Should be kept dry in winter. South Africa.

BABIANA.—Dwarf bulbous plants from South Africa, with hairy, plicate leaves and Ixia-like flowers. *B. disticha*, pale blue; *B. plicata*, purple; *B. stricta* and varieties, blue, red, yellow, or white; *B. tubata*, yellow and red; and *B. tubiflora*, red.

BANKSIA.—Australian evergreen shrubs which require a cool, airy house. Fibrous peat, loam, and charcoal. The flowers are in cones.

B. grandis. Handsome pinnatifid leaves a foot long.

B. integrifolia. Oblong leaves 6 inches long by 1 inch wide.

B. marginata. A bushy plant with small blunt leaves.

B. serrata. Very strong; corky bark; serrated leaves; flower-heads 4 to 6 inches long, 3 inches wide.

BEAUMONTIA GRANDIFLORA.—Stout climber with large, ovate, deciduous leaves and large bell-shaped white fragrant flowers in clusters. Should be planted in a border, and trained against a pillar in a sunny position. India.

BIGNONIA CHERERE has large bright-scarlet flowers, and thrives in a sunny position in a greenhouse. *B. Tweediana*, yellow, and *B. speciosa*, mauve, are other good greenhouse climbers.

BLANDFORDIA.—Australian bulbs with Rush-like leaves and large bell-shaped, yellow or orange-yellow flowers in umbels or racemes. Summer. Sandy peat in well-drained pots. *B. aurea*, yellow; *B. Cunninghamii*, red and yellow; *B. marginata*, orange-red; and *B. nobilis*, orange with paler margins, are the best.

BOMAREA.—South American climbers, with flowers like Alstromeria; should be trained to the rafters of a sunny greenhouse. Loam and peat.

B. acutifolia. Scarlet and yellow flowers in large umbels.

B. Caldasiana. Yellow with scarlet spots; very free.

B. Carderi. The largest. Flowers in very large, loose, drooping umbels, pink and green with crimson spots.

B. pataocensis (*conferta*). Large umbels of dark-red flowers.

BORONIA.—Australian shrubs, with numerous pretty, red, rose, or brown fragrant flowers. Should be grown in a cool, airy house and carefully watered, especially in winter. Fibrous peat.

B. elatior. Leaves pinnate, flowers rosy-red in dense clusters along the upper half of the young branches.

B. heterophylla. A compact bush with crowded erect branches, pinnate leaves, and numerous globose bright-red flowers. Spring.

B. megastigma. Flowers brown and yellow; very free and fragrant. Spring.

B. serrulata. A dwarf plant with simple leaves; very floriferous; flowers deep-rose.

BRACHYSEMA.—Australian Leguminosæ with long scandent shoots and ovate leaves; flowers red. Cool greenhouse. Peat. The best known are *B. acuminatum*, with silvery, ovate leaves an inch long, and red flowers $1\frac{1}{2}$ inches long; and *B. subcordatum*, with smaller leaves and flowers.

BUDDLEIA COLVILEI is a large shrub with Pentstemon-like red flowers, an inch across, in long racemes. Himalaya. *B. madagascariensis* has large silvery leaves and long racemes of small yellow flowers. *B. variabilis* has lilac flowers; *B. asiatica*, racemes of small white flowers; and *B. paniculata* are other useful greenhouse shrubs.

CALLICARPA PURPUREA is a loose, free-growing Chinese shrub with long shoots, bearing bright-purple berries in profusion in winter. Loam.

CALLISTEMON.—Evergreen, peat-loving shrubs of the Myrtle family. Their flowers are arranged round the young stem in a dense mass, hence the popular name "Bottle-brush". The best species are: *C. brachyandrus*, yellow flowers; *C. coccineus*, red; *C. rigidus*, crimson; *C. salignus*, red; and *C. speciosus*, crimson.

CAMPANULA.—The following are worth growing for the greenhouse:

C. pyramidalis. A biennial raised from seeds sown in summer, the plants being grown on to flower in 10-inch pots when two years old. They require protection from damp in winter.

C. Vidalii, a shrubby perennial from the Azores; has white flowers borne on upright, leafy branches in summer. Seeds. Loam.

CANTUA.—Scandent shrubs from South America, suitable for training against a pillar or wall in a sunny greenhouse. The leaves are small and the flowers tubular in drooping clusters at the ends of the branches. Loam. Cuttings.

CAPSICUM.—Ornamental fruits. From seeds sown in spring, in heat, well-fruited specimens may be had in 6-inch pots by the autumn. They are forms of either *C. annuum* (Chilies) or *C. minimum* (Cayenne Pepper).

CASSIA.—Showy Leguminous shrubs with yellow flowers. Loam and peat.

C. australis. Small bush; pinnate leaves; yellow flowers. Australia.

C. corymbosa. A large bush with dark-green leaves and large corymbs of yellow flowers. May be treated as a climber. Tropical America.

C. lavigata. Strong bush; large leaves and corymbs of yellow flowers. Tropics.

C. occidentalis. Large pinnate leaves and yellow flowers. Tropics.

CELSIA.—Biennials closely resembling Verbasum. The two best species for indoors are *C. Arcturus*, a bushy plant 3 feet high with large yellow flowers, and *C. cretica*, which usually makes a single stem 4 to 5 feet high and has yellow flowers an inch across. Loam.

CESTRUM (Habrothamnus).—Scandent shrubs with terminal heads of red or yellow flowers, of

easy culture, and useful for covering walls or pillars. After flowering they should be spurred hard back. Loam. Cuttings.

C. aurantiacum. Glabrous leaves; golden flowers in terminal panicles, produced in July, September, and December. Guatemala.

C. elegans. Leaves hairy; flowers red, in large terminal cymes. Winter and spring. Mexico.

C. Newellii. Like *C. elegans*, but scarlet flowers. March to May.

CHIRONIA.—South African Gentians, which flower with great freedom. *C. floribunda* has numerous thin stems 9 inches high, small leaves, and pink flowers; *C. linoides* (*ixifera*) is an upright bush a foot high, with glaucous leaves and pink flowers; *C. peduncularis* has larger leaves and flowers. Peat and loam.

CHLOROPHYTUM.—Tufted Liliaceous plants. *C. elatum*, var. *variegatum*, is an ornamental plant with elegant white and green leaves; stands well in rooms. Loam. South Africa.

CHORIZEMA.—Australian shrubs with small Pea-shaped, red and yellow flowers. May be grown as bushes or trained on low trellises. Sandy peat in a cool, airy house. Spring. *C. cordatum*, *C. ilicifolium*, and *C. varium* are the best.

CITRUS.—Greenhouse evergreens, including the Orange and the Lemon. They require heat in spring when commencing to grow, afterwards plenty of air and sunlight. Flowers are produced at all times.

C. Aurantium (Sweet Orange). Of this there are many forms, that known as the Otaheite Orange being a small bush which fruits freely when only a foot or so high.

C. Decumana, the Shaddock or Pumelo. A large-leaved tree. The Grape fruit is a variety of it.

C. medica, var. *Limetta*, the Sweet Lime.

C. medica, var. *Limomum*, the Lemon. Of this there is a form, Metford's Lemon, which has fruits nearly three pounds in weight.

C. nobilis, var. *Tangerina*, is the Tangerine Orange.

CLEMATIS INDIVISA, from New Zealand, is an excellent greenhouse climber, with dark-green, ternate leaves and large panicles of white flowers.

CLETHRA ARBOREA, the "Lily of the Valley Tree", from Madeira, forms a large bush or small tree with oblong glossy leaves and large panicles of waxy-white, fragrant flowers. Loam and peat.

CLEYERA JAPONICA, var. *variegata* (*Eurya japonica*), a Japanese shrub with the habit of a Laurel, and ovate, green, yellow, and crimson leaves. Loam. Cuttings.

CLIANTHUS.—Australian climbers of the Leguminous order. *C. Dampieri*, the "Glory Pea" of Australia, has herbaceous stems, silky pinnate leaves, and racemes of four to six flowers, which are bright-red with a large purple, eyelike blotch. It is difficult to grow, but good plants are sometimes obtained when grafted on stocks of *Colutea*. *C. puniceus*, the "Parrot's Bill", has long scandent shoots, and is a good plant for pillar or rafter. It has pendent clusters of scarlet flowers. Loam and peat.

COBÆA SCANDENS is a quick-growing climber, with pinnate leaves and tubular flowers 3 inches long. Var. *variegata* has golden variegated leaves.

CORDYLINE.—Of the true species, the most serviceable in the greenhouse are: *C. australis*, which is useful when small for table decoration, and when planted out it attains a height up to 40 feet. The flowers are white, in large upright panicles, and very fragrant. Var. *Doucettii* has variegated leaves; *lentiginosa* has purple leaves; *gracilis* has narrow rigid leaves. *C. indivisa* is a

distinct species with wide leaves with a broad red midrib. Loam.

CORONILLA GLAUCa has slender, erect stems, glaucous leaves, and yellow fragrant flowers in erect umbels. Loam and peat. Southern Europe.

CORREA.—Dwarf Australian shrubs with small ovate leaves and pendulous, tubular flowers. They flower in winter in a light, cool, airy house. Cuttings, or grafted on *C. alba*.

CRINUM.—Bulbous evergreen or deciduous plants, with long leaves and large handsome flowers, white, pink, or purple, in umbels, on



Fig. 149.—*Crinum scabrum*

stout stems well above the leaves. They should be grown in loamy soil in large pots or borders. The following thrive in a greenhouse:

C. latifolium. Leaves long and broad, wavy; flowers in large umbels, white.

C. longifolium (*capense*). Long narrow leaves, pink flowers.

C. Macowani. Leaves 3 feet long; flowers white, tinged red.

C. Moorei. Large leaves, flowers white, suffused with rose. Var. *alba* has pure-white flowers, and var. *variegata* has variegated leaves.

C. Powellii. A hybrid between *C. longifolium* and *C. Moorei*, intermediate in character.

C. scabrum (fig. 149). Bulb large, short necked; leaves ensiform, 3 feet long; flowers white with red stripes.

CROTALARIA.—Leguminous shrubs, with pinnate leaves, and yellow flowers. *C. longirostrata*, from Mexico, is one of the best. It has small leaves, and bears long upright racemes of large deep-yellow flowers in autumn and winter. Cuttings or seeds. Loam and peat.

CYPHOMANDRA.—*Solanum*-like, with a thick

fleshy stem, large leaves, and Potato-like flowers. *C. betacea*, the "Tree Tomato", grows 12 to 15 feet high, and forms a large branching head clothed with cordate leaves a foot long, and white flowers, succeeded by Plum-like edible fruits which are orange-red when ripe. Over two hundred fruits have been borne by a single plant. Loam. Cuttings or seeds.

CYTISUS (*Genista*).—The greenhouse species are natives of Southern Europe or the Canaries. Loam and manure. Cuttings or grafts.

C. canariensis. Dense habit, small leaves and flowers.
C. filipes. Loose elegant habit, white flowers.
C. fragrans (*racemosus*). Bushy habit, dense racemes of yellow flowers; forces well.
C. fragrans, var. *elegans*, is larger than the type; a very useful plant. Must be grafted.

herbs from South America, with large trumpet-shaped flowers. Should be allowed plenty of root-room. Loam. Cuttings.

D. arborea. Large bush, white flowers 8 inches long.
D. chlorantha. Large bush, handsome yellow flowers.
D. fastuosa. Annual; large purple flowers.
D. sanguinea. Large bush, red flowers striped with green.
D. suaveolens (*Knightii*) (fig. 150). White flowers, fragrant, very free.

DESFONTAINEA SPINOSA.—A Holly-like bush with tubular flowers $1\frac{1}{2}$ inches long, scarlet, tipped with yellow. Peru. Peat and loam. Sunny, airy house.

DIOSMA ERICOIDES.—A Heath-like shrub from South Africa remarkable for its fragrant foliage; flowers white. Sandy peat. Cuttings.

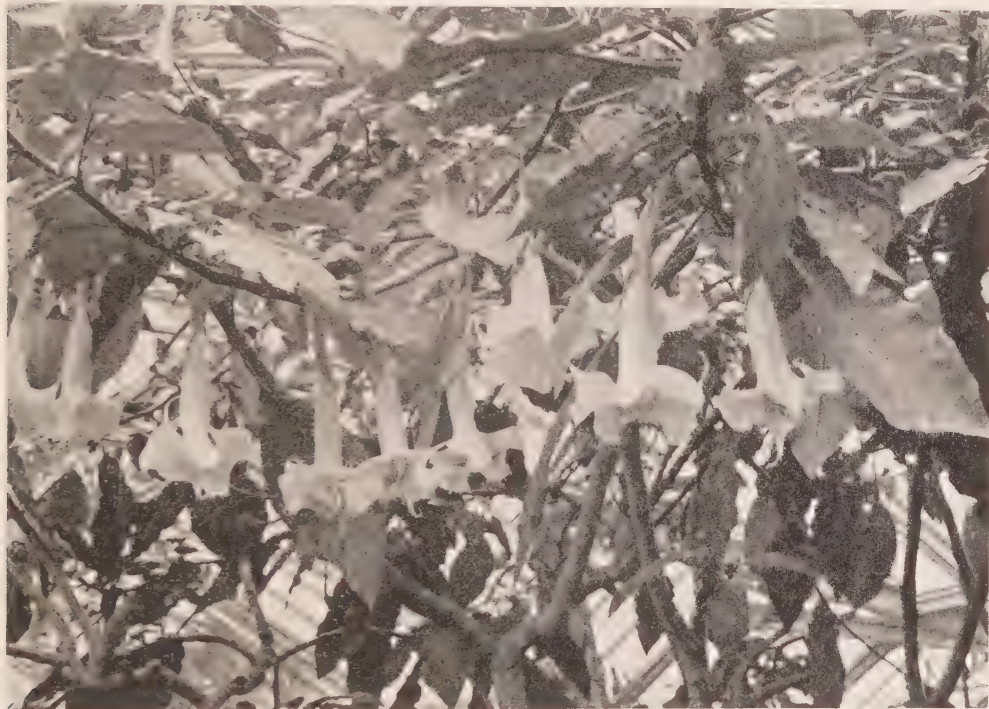


Fig. 150.—*Datura suaveolens* (*Knightii*)

DAPHNE.—Evergreen or deciduous shrubs with fragrant flowers. *D. odora* (*indica*) is a Japanese evergreen with compact heads of white and pink flowers produced in winter. Loam and peat. Cool, airy house or frame.

DARWINIA (*Genetyllis* and *Hederoma*).—Australian evergreen shrubs with small flowers enclosed in bells formed of bright-coloured bracts. *D. fimbriata* has roundish pink flowers and *D. macrostegia* (*tulipifera*) has larger leaves and larger heads of yellow and red flowers. Peat.

DASYLIRION.—Mexican Liliaceæ with thick woody stems, and a large head of long elegant leaves. Flowers in panicles on stems 10 or 12 feet high. Useful for large conservatories. Sandy loam. *D. acrotrichum*, with serrated leaves, and *D. glaucophyllum*, with grey-green unarmed leaves, are two of the best.

DATURA (*Brugmansia*).—Solanaceous shrubs or

DORYANTHES EXCELSA and *D. PALMERI* are handsome Amaryllids with Dracæna-like strap-shaped green leaves 8 to 10 feet long and 4 inches wide. The flowers, which are rarely produced, are borne on tall pole-like stems, and are very handsome. Australia. Loam and peat.

ECHIUM.—The shrubby Buglosses from the Canary Islands are handsome, with long, hairy leaves and large dense terminal heads of blue, red, or white flowers. The best known are *E. callithyrsum*, a large bush with heads of blue flowers, and *E. Wildpretii* (fig. 151), a biennial with a tall pyramidal spike of pinkish flowers. Seeds.

EPACRIS.—Free-flowering Australian shrubs of Heath-like habit. After flowering they should be cut back and placed in an intermediate temperature until growth recommences. They should then be repotted in sandy peat, and when estab-

Fig. 151.—*Echium Wildpretii*

lished they should have all the air and light possible. Sandy peat.

ERIOSTEMON.—Evergreen, peat-loving, compact shrubs from Australia. Flowers usually white and fragrant. They do well when grown either in pots or borders.

- E. buxifolius*. Small Box-like leaves and white flowers.
- E. myoporoides*. Leaves 2 inches long, narrow; flowers half an inch across.
- E. nerifolius*. Lanceolate leaves, orange-like blossoms; free.
- E. scaber*. Linear leaves and white, pink-tinted flowers.

ERYTHRINA.—Leguminous plants with ternate leaves and spikes of large red Pea-shaped flowers; shrubby, or arboreal in habit. Loam. Cuttings or seeds.

- E. Crista-galli* has a thick fleshy root-stock which produces annually stout stems 4 to 6 feet high, bearing large red flowers. Brazil.
- E. herbacea* is a dwarf plant with long arching racemes of red flowers. Southern United States.
- E. Humeana* is a bush 8 to 10 feet high, bearing racemes over a foot long of scarlet flowers. South Africa.

EUCALYPTUS.—Australian trees or shrubs, some of which are handsome when young, and a few are worth growing for their flowers. The best for the greenhouse are: *E. calophylla*, *E. citriodora*, *E. ficifolia*, *E. globulus*.

EUPATORIUM.—Shrubby or herbaceous composites with white or purple Ageratum-like flowers. Cuttings in spring; afterwards treated as for Chrysanthemums.

- E. atrorubens*. Compact habit, large ovate leaves and reddish-purple flowers. Mexico.
- E. glandulosum*. Tall, with large heads of white flowers.
- E. probum*. Compact habit, small leaves, white flowers.
- E. Raffillii* (fig. 152). Large bronzy-green leaves and spreading heads of pale-purple flowers.
- E. riparium*. Dwarf, white, free flowering; red stems.

FATSIA JAPONICA (*Aralia Sieboldii*) is largely used for house decoration. It produces large terminal panicles of white flowers in November. There is a variety with variegated leaves. *F. papyrifera*, the "Rice-paper Tree", is handsome when planted in a border; it has large, grey, lobed leaves nearly 2 feet across. China. Loam.

FEIJOA SELLOWIANA.—A Brazilian Myrtle-like shrub with ovate leaves and showy crimson and white flowers. Requires a sunny position and a loamy soil.

GREVILLEA.—A large Australian genus of trees or shrubs. All are hard-wooded, and require sandy peat.

- G. alpina*. Small bush, red and white flowers in terminal racemes.
- G. Banksii*. Small tree, large pinnatifid leaves, dense terminal racemes of bright-red flowers.
- G. ericifolia*. Heath-like habit, red and yellow flowers.
- G. fasciculata*. Stiff, upright plant, scarlet and yellow flowers.
- G. ilicifolia*. Holly-leaved, red flowers.
- G. pumicea*. Flower crimson in pendant heads.
- G. robusta* is a pretty pot plant, with large tripinnate leaves; largely used for table decoration. Seeds.

HÆMANTHUS.—Bulbous Amaryllids. Chiefly South African. In many of the species the flowers are produced in advance of the leaves. When growing, plenty of water must be given, reducing the supply as the leaves begin to decay. A decided period of rest is required. At all times they like as much sun as possible.

Fig. 152.—*Eupatorium Raffillii*

H. albiflos. Large wide leaves, white flowers with golden stamens. Summer.

H. cinnabarinus. Leaves long, few in number; flowers red, in large dense umbels. Spring.

H. coccineus. Large spreading leaves, red flowers in dense heads. October.

H. Katharinæ. Stem 18 inches, head of leaves; flowers rich-crimson lateral.

H. multiflorus. Leaves forming a stem a foot long; flowers scarlet with yellow anthers, in large heads.

HARDENBERGIA.—Australian climbing plants with Pea-shaped flowers. *H. Comptomiana* has ternate or five-lobed leaves, and numerous racemes, 3 inches long, of purple flowers in spring; *H. monophylla* has smaller leaves and flowers. Of the latter there are varieties with red and white flowers. Peat and loam. Seeds or cuttings.

HEDYCHIUM.—Ornamental plants of the Ginger family, with rhizomatous root-stock and long narrow leaves on erect stems; flowers in terminal racemes, showy, fragrant. *H. Gardnerianum*, a Himalayan plant, is the most suitable for the greenhouse. It grows from 5 feet high, and bears yellow flowers in wide racemes a foot long. Loam. Division. The other species are tropical.

HELICHRYSUM (*Aphelaxis*).—Loose-habited shrubs with silvery, scale-like leaves, and pink or red-purple flowers. Spring. Sandy peat. Cuttings. The best known are: *H. grandiflorum*, *H. humile*, and *H. sesamoides*.

HIBBERTIA DENTATA, an Australian climber with yellow flowers, and copper-coloured ovate leaves.

HIDALGOA WERCKLEI.—The climbing Dahlia. It grows quickly, and has much-divided, elegant leaves and scarlet flowers 3 inches across. Loam. Cuttings.

HOVEA.—Australian shrubs with blue, purple, or violet Pea-shaped flowers. *H. Celsi* (*elliptica*),

with oval leaves an inch long and numerous deep-blue flowers, and *H. longifolia*, with longer leaves and larger flowers, are grown in the greenhouse.

HUMEA ELEGANS.—A biennial composite with scented leaves and large erect terminal plumes of grey flowers. Seeds should be sown in sandy soil in July, and the plants grown on throughout winter and spring. In March the stems will begin to elongate, and by July the plumes of flowers, often 8 feet high, will be at their best. They last for several months. Australia.

IXIA.—South African bulbs of easy culture. Should be grown in a sunny house or frame, starting them in October. They require to be rested dry after the foliage withers. The star-shaped flowers, often brilliantly coloured, are borne on elegant scapes well above the leaves.

JASMINUM.—Evergreen or deciduous shrubs, two of which are suitable for the warm greenhouse, viz. *J. gracillimum*, with ovate leaves and loose heads of fragrant white flowers, and *J. grandiflorum*, of more bushy habit. Loam and peat.

KENNEDYA.—Australian climbers with racemes of Pea-shaped flowers. Loam and peat. Spring.

K. nigricans, black and yellow flowers and ternate leaves; a strong grower.

K. prostrata (*Marryattæ*), with scarlet flowers, forms a screen or curtain if trained along a rafter and the shoots allowed to hang.

K. rubicunda is a strong grower with red flowers.

LANTANA.—Small bushy soft-wooded plants with heads of red, yellow, orange, or white Verbenalike flowers. Propagated by cuttings. Although usually grown to flower in winter, they flower freely at any time. Loam.

LAPAGERIA ROSEA (fig. 153) and its variety *alba* are Chilean climbers with tough, ovate leaves and large tubular, fleshy, pendulous flowers. Succeed



Fig. 153.—*Lapageria rosea*

in a shaded house, in a mixture of sandy rough peat and charcoal, which should be well drained so that water may be given freely. *Philageria*



Fig. 154.—*Luculia gratissima*

Veitchii, raised from *L. rosea* and *Philesia buxifolia* is an interesting bigeneric hybrid.

LEPTOSPERMUM.—Australian Myrtle-like shrubs with starry-white, crimson, or yellowish flowers. *L. scoparium*, with small leaves and white flowers $\frac{1}{2}$ inch across, and several colour varieties of it

named *Nicholii*, *Boscaweni*, *Donardii*, &c., are good greenhouse plants.

LONICERA SEMPERVIRENS produces whorls of scarlet and yellow flowers $1\frac{1}{2}$ inches long, nearly the whole of the year. *L. Hildebrandiana*, from Burma, a sturdy climber, has apricot-coloured flowers 6 inches long. Loam.

LUCULIA GRATISSIMA (fig. 154) forms a large bush 8 to 12 feet high, clothed with oval leaves 6 inches long. The flowers—which are very fragrant and rose-coloured—are developed in large terminal heads in summer. *L. Pinccana* differs in having white flowers and narrower leaves. Peat and loam. Pot or border. Cuttings.

MAGNOLIA.—The following species may be grown in the greenhouse:

M. Campbelli. Flowers 10 inches across, pale-rose inside, red outside. Deciduous tree. Himalaya.

M. fuscata (*Michelia fuscata*). An evergreen shrub with small purple and yellow fragrant flowers. China.

MANDEVILLA SUAVEOLENS.—A South American deciduous climber with large white Vinca-like flowers borne in summer. Peat and loam. Border.

MESEMBRYANTHEMUM.—Chiefly South African sub-shrubby or herbaceous fleshy-leaved plants with conspicuous red, white, or yellow flowers. They thrive in light sandy loam in full sunshine.

M. blandum. Compact, $1\frac{1}{2}$ feet high, large white flowers.

M. Brownii. A compact bush $1\frac{1}{2}$ feet high, flowers magenta.

M. coccineum. Compact bushy habit, brilliant scarlet flowers.

M. lacerum. Dwarf; thick, triangular leaves; yellow flowers.

M. muricatum. Dense, with small glaucous leaves, flowers red.

M. rhomboideum. Thick, fleshy leaves; yellow flowers.

M. uncinellum. Dense mass, with small glaucous leaves.

MIMULUS GLUTINOSUS (*Diplacus*), a small shrub with ovate leaves and salmon-coloured flowers an inch across, produced freely for the greater part of the year. Var. *coccineus* has red flowers. Loam. Cuttings.

MITRARIA COCCINEA (fig. 155), a shrubby Gesneriad from Chili, has small ovate leaves and



Fig. 155.—*Mitraria coccinea*

tubular scarlet flowers an inch long. Peat and loam. Cuttings.

MORÆA.—Iris-like plants, both in regard to character and soil requirements.

M. bicolor. Leaves narrow, 2 feet long; flowers white, with a purple blotch at the base of the outer segments. South Africa.

M. iridioides. White flowers with yellow spots. South Africa.

M. Robinsoniana. A robust plant from Lord Howe's Island. Leaves 6 feet long by 3 inches wide. Flowers on tall branching scapes, white; often fifty to one hundred flowers on one inflorescence.

MYRTUS COMMUNIS, the "Myrtle", with its glossy-green leaves and white fragrant flowers, is useful when grown as a pyramid or standard. Loam. Cuttings.

M. bullata. Reddish-green, oval, wrinkled leaves. New Zealand.

M. obcordata. An elegant bush with wiry growth and small leaves. New Zealand.

M. Cuni. A dense bush with small leaves, white flowers, and currant-like edible fruit. There is a form with prettily variegated leaves. Chili.

NERIUM OLEANDER is an evergreen shrub with long narrow leaves and handsome flowers in large terminal panicles. It grows to a height of 10 feet. There are many varieties with white, pink, red, single or double flowers. Loam. Southern Europe.

OLEARIA.—Shrubby composites, remarkably free-flowering. Some species are hardy, others require greenhouse treatment. Peat and loam. Cuttings.

O. argophylla (Muskwood). Large lanceolate leaves, green above, silvery beneath, with the odour of Musk.

O. compacta. A dwarf compact plant with small leaves, white on the under surface.

O. insignis. Roundish leathery leaves, green above, white beneath. Flowers large, white.

O. nitida. A neat, compact, free-flowering shrub with elliptical leaves.

O. semidentata. Woolly stemmed shrub, 3 feet, lanceolate-toothed leaves and terminal flower-heads, 2 inches across, pale-purple.

O. stellulata (Gunniana). A neat small-leaved shrub with large heads of starry-white flowers.

OXALIS.—Herbaceous plants with short stems, or bulbous or rhizomatous root-stocks. Flowers white, yellow, pink, or red. They thrive in sandy loam in a sunny house or frame.

O. Bowieana. Large trifoliate leaves and large rose-red flowers in umbels. South Africa.

O. carnosa. Fleshy stems, small leaves, yellow flowers. Chili.

O. crenata. Tall stems, obovate leaflets, yellow flowers. Peru.

O. floribunda. Dwarf free-growing plant with umbels of white, red, or pink flowers.

O. hirta. Dwarf pinnate leaves, deep-red flowers. South Africa.

PASSIFLORA.—The Passion Flowers should be grown in rich loam and trained on wires a few inches from the glass, allowing the lateral shoots to hang down. As they are rapid growers, frequent pruning is essential. Suitable greenhouse species and varieties are:

P. atropurpurea. A hybrid with purple flowers 3 inches wide; the corona violet with white dots.

P. cœrulea (fig. 156). White or lilac, with purple corona rays; fruit pendulous, yellow, egg-shaped. Brazil.

P. cœrulea-racemosa. A hybrid between the two species, indicated with reddish-purple flowers; very free.

P. edulis (Granadilla). A Brazilian plant with whitish flowers followed by roundish egg-shaped, purple edible fruit.

P. Munrei. A garden hybrid between *P. alata* and *P. cœrulea*. Leaves large; flowers 5 inches across, flesh-coloured, the corona blue.

PENTAPTERYGIIUM.—*Vaccinium*-like shrubs with thick woody stems and numerous branches.

They grow well planted out among stones or roots in well-drained sandy peat, or they may be grown in pans.

P. rugosum. A loose-habited bush with ovate-lanceolate leaves and pendulous flowers an inch long borne freely from the old wood; flowers white, lined with red.

P. serpens has long arching branches clothed with small Box-like leaves. From the under side of the previous year's wood and along its whole length, pendulous scarlet flowers an inch long are produced in spring.

PHILESIA BUXIFOLIA is a dense bush with Box-like leaves and red flowers, smaller than, but in shape like, *Lapageria*. Chili. Peat.

PHORMIUM (New Zealand Flax).—Herbaceous plants with long, tough, Iris-like leaves and inflorescences sometimes 10 feet high; flowers yellow or purplish. They make fine plants when grown in large pots or tubs.

P. Cookianum. Arching leaves 5 or 6 feet long.

P. Hookeri. Leaves 4 to 5 feet long and flower-stalks 6 feet high, flowers purple.

P. tenax. Rigid leaves often 8 feet long, very tough. There are purple and variegated varieties.

PIMELIA.—Free-growing compact plants bearing in spring neat, round, terminal heads of pink or white *Daphne*-like flowers. They thrive in a



Fig. 156.—*Passiflora cœrulea*

cool, airy greenhouse in a compost of peat and loam. Cuttings.

P. ferruginea (*decussata*). Oblong leaves half an inch long, red flowers in heads an inch across.

P. ligustrina. Ovate leaves an inch long, flowers white in large heads.

P. spectabilis. Long narrow leaves, large heads of white flowers tinged with pink.

PITTOSPORUM.—A large genus of evergreen trees and shrubs, some of which are favourite garden plants. They thrive in peat and loam in pots or borders.

P. crassifolium. Oblong dark-green leaves, white beneath; flowers dark-purple. New Zealand.

P. tenuifolium. Neat bush; small green leaves. New Zealand.

P. Tobira. Strong bush; large oval leaves. China and Japan.

P. undulatum. Large bush; oval leaves, white fragrant flowers.

PLATYTHECA GALIODES (*Tetralthea verticillata*) is a Galium-like shrub from Australia. It grows about 18 inches high, has small linear leaves, and blue flowers nearly an inch across. Peat. Cuttings.

PLEROMA.—Ornamental shrubs with showy flowers. *P. macranthum* is a straggling bush with large ovate leaves and purple flowers 4 inches across. Var. *floribundum* has still larger flowers. Brazil. Peat and loam.

PLUMBAGO CAPENSIS is a scandent shrub useful for draping pillars. It is rarely out of flower. The type is light-blue, and there is a white-flowered variety. South Africa. *P. rosea* is dwarf, and has rose-coloured flowers.

POLYGALA.—The greenhouse species are woody plants with showy Pea-shaped blossoms. They are easily grown, thriving in a mixture of peat and loam. *P. myrtifolia*, with Myrtle-shaped leaves and purple flowers, var. *grandiflora*, with larger flowers, and *P. oppositifolia*, with small opposite leaves and purple flowers, are useful.

PROTEA.—South African evergreen shrubs. The flowers are in round heads surrounded by bracts, which are often very showy. Cool, airy house. Sandy peat.

REHMANNIA.—Chinese herbaceous biennials, related to Digitalis. Stems from 2 to 6 feet high, with lobed hairy leaves, and large purplish or white flowers, darker in throat. The best are: *R. angulata*, *R. chinensis*, *R. elata*, *R. glutinosa*, and *R. Henryi*. *R. Kewensis* (fig. 157) is a hybrid between *chinensis* and *Henryi*.

REINWARDTIA.—Related to Linum. Dwarf free-flowering pot-plants. *R. tetragyna*, with oval acuminate leaves and yellow flowers over an inch across, and *R. trigyna*, similar in habit, but with three instead of four styles. India. Loam and peat.

RHODOCHITON VOLUBILE, the only species, is a climbing Mexican plant with cordate leaves and reddish calyces, with nearly black corollas, freely produced. Loam and peat.

SCHIZANTHUS.—Chilian annuals, notable for their showy flowers. *S. pinnatus* grows 3 feet high, has small pinnatifid leaves, and lilac or violet flowers. *S. retusus* grows quite as high, and has red flowers.

SOLANUM.—The shrubby or scandent species with Potato-like flowers and often ornamental fruit are useful for the conservatory. Loam. Seeds or cuttings.

S. aviculare, "Kangaroo Apple", 3 feet, entire or pinnatifid leaves, large blue flowers, scarlet fruit.

S. capsicastrum, the "Winter Cherry". A perennial bush 2 feet high, with small green leaves, white flowers, and round or oval, bright-red, Cherry-like fruit. Brazil.

S. jasminoides. Strong climber, small leaves, large pendulous heads of white flowers. Brazil.

S. macrocarpum. Biennial with large spiny leaves and scarlet Tomato-like fruit. Tropical Africa.

S. Melongena, the "Egg Plant". An annual with large leaves and white, yellow, or purple, egg-shaped, edible fruit from 3 to 9 inches long. Tropics, Old World.

S. rostratum. A Mexican species with pretty, finely-cut greyish leaves and large yellow flowers.

S. Wendlandii. Vigorous climber, with coarse pinnate leaves, and very large heads of blue-purple flowers.

SPARAXIS.—South African bulbous plants allied to *Ixia*. They require loamy soil and full sun. Of the numerous species *S. bulbifera*, with small yellow Gladiolus-like flowers; *S. grandiflora*, purple or white; and *S. tricolor*, with numerous varieties varying in colour—white, yellow, brown, or red, may be recommended.

SPARMANNIA AFRICANA.—A South African shrub



Fig. 157.—*Rehmannia Kewensis*

with large lobed leaves and white flowers produced in winter. Loam.

STATICE.—The shrubby species from the Canary Islands have large corymbose flower-heads, often blue, scarious, and lasting for two months. Loam, leaf-mould, and manure. There are a large number of species and hybrids in cultivation.

STRELITZIA.—Leaves large, ovate, on long petioles; flowers brightly coloured. The best known are:

S. Augusta. A tall plant with a thick, woody stem, large Banana-like leaves, and white and blue flowers. South Africa.

S. Reginae, 3 to 4 feet high, with numerous radical leaves 2 feet long by 7 inches wide. Flowers on long scapes in dense one-sided racemes, orange and blue. Var. *citrina* (fig. 158) has lemon-yellow petals. South Africa.

S. Kewensis is a hybrid between these two.

STREPTOSOLEN.—*Jamesoni* from Colombia makes long scandent shoots, which in spring are clothed with heads of orange-scarlet flowers. Loam.

SWAINSONA.—Australian and New Zealand sub-shrubby plants with pretty Pea-shaped flowers.

S. coronillifolia makes slender scandent shoots several feet long, with pinnate leaves and long racemes of bright-red flowers. *S. Greyana* has larger leaves and larger pink flowers. Loam and peat. Cuttings.

TACSONIA.—Greenhouse climbers similar to *Passiflora*. Should be planted in a border of

require to be disbudded. The first named is scarlet, the latter yellow.

TRACHELIUM CÆRULEUM, though almost hardy, is grown for greenhouse decoration on account of its large loose corymbose heads of small blue flowers. It is a herbaceous plant 2 feet high. Loam. Seeds or cuttings. Southern Europe.



Fig. 158.—*Strelitzia Reginæ* (var. *citrina*)

peat and loam, and trained to the rafters of a sunny house. Cuttings.

T. exoniensis. A garden hybrid between *T. Van-Volxemii* and *T. mollissima*.

T. insignis. Leaves simple, ovate; flowers large, crimson, 5 inches across. South America.

T. mameata (ignea). A strong-growing plant with three-lobed leaves and scarlet flowers. Peru.

T. militaris. A garden hybrid, like *exoniensis*, but has bright carmine-red flowers.

T. mollissima. Large three-lobed leaves; long, tubular, pink flowers 2 inches across. Colombia.

T. Van-Volxemii. A strong-growing, free-flowering plant with showy crimson flowers 5 inches across. Colombia.

TECOMA.—Bushy or scandent shrubs. *T. capensis* and *T. Smithii* flower well if cuttings are rooted in spring, and the young plants stood in a frame until June, then out-of-doors. The shoots

TRICUSPIDARIA (Crinodendron) LANCEOLATA.—A woody shrub or small tree from Chili. Leaves 3 to 5 inches long; flowers pendulous, over an inch long, fleshy, blood-red; they last a month or more. Peat. Cuttings.

VERONICA.—Many of the shrubby kinds from New Zealand are worth growing in pots for the greenhouse in winter; they can be placed outside for two-thirds of the year. Rich loamy soil. Some of the best are: Constellation, pink; Eclatante, red; La Séduisante, reddish-purple; and Madame Chrétien, purple.

WITSENIA CORYMBOSA is a shrubby Irid from South Africa. It has erect stems, clothed with glaucous-green Iris-like leaves arranged fan-like, and, in winter, corymbs of bright-blue flowers. Peat. Cool, airy house.

THE STOVE OR TROPICAL HOUSE

For the successful cultivation of plants indigenous to tropical countries, it is necessary to have houses artificially heated, and to provide other conditions essential to their welfare. Where a variety of species have to be grown together in one house, they should be such as will thrive under the conditions provided. Of course to attain perfection in the cultivation of any particular group of plants a special house is needed, with conditions as to temperature, light, moisture, &c., all carefully adjusted to the peculiar wants of the plants.

An ordinary stove or tropical house does not differ from a greenhouse except in temperature, and at times in atmospheric moisture. The form and internal arrangements may be the same, except in the following particulars: side-stages, $2\frac{1}{2}$ feet wide, on a level with the wall-plate; in the centre a tan-pit 5 feet wide, the walls, including plate, 3 feet above level of floor; this will allow for a $3\frac{1}{2}$ -feet path all round, betwixt the pit and the side-stages.

Ventilation.—For a stovehouse the side-sashes should be fixed, but in the walls below there should be openings 2 feet long by 1 foot wide, fitted with hinged shutters in frames; these openings should be about 9 feet apart. In the roof there should be lights at intervals, hinged at the ridge, which also should open with a lever. These will afford ample ventilation, and the air, which will be principally admitted through the wall-ventilators, will always be in a fit state for the plants, by its having first passed over the pipes.

Heating.—The hot-water pipes should be placed under the stages on each side, and five rows of 4-inch pipes, three flows and two returns; there should be evaporating-troughs at intervals, which can be filled or otherwise as needed. In many stoves the central space consists of a brick bed 3 feet high filled with clinkers, &c., and surfaced with ashes. This is suitable for the larger plants usually found in stoves, and involves less labour than a plunging bed.

A spacious tank should be provided to store rain-water from the roof.

Shade.—There are usually a number of plants that require shading in the summer season, and others that are much better without it. To accommodate both the better way is to shade half of each side of the roof. It is best that the shading should be fixed to rollers, to run up and down as required.

The intermediate house should be similar to that already described with the exception that fewer hot-water pipes will be sufficient; the central bed and general arrangement should be the same, not omitting the water-tank.

Temperature.—Plants from distinctly tropical regions are subject to a high temperature all the year round, the only change being from hot and dry to hot and moist. The small amount of light we get through the winter, as compared with that in tropical countries, necessitates an enforced rest during winter for many plants which would otherwise grow. It is neither necessary nor desirable, especially in the winter months, to maintain in a plant-stove as much heat as the occupants would be subject to in a wild state.

The warmest house should be kept at 65° by night, but in very cold weather 5° lower is safe and on the whole better. During the day 5° higher may be maintained. In February a few degrees more may be given if the light is favourable and the outside temperature mild. Towards the end of April the temperature should be 65° or 70° at night, and 10° higher by day, especially if the sun has any power. It must be understood that these temperatures are advised for thoroughly good light houses, with the plants kept up to the glass and well managed in every way. From May onwards the temperature may be kept at about 70° at night, whilst during the day it may rise to 90° with sun. By the end of August growth will be finished, and the plants should be treated for ripening. This is done by reducing the atmospheric moisture by the admission of more air and with

less shading, but not by the reduction of temperature until the ripening process is complete. In November and December the night-temperature should be kept at from 65° to 60°.

In the intermediate house the temperatures day and night should range about 10° lower than those given above, both in summer and winter.

Soils.—Stove plants as a rule are not so particular as to soil as are greenhouse plants, nevertheless there are many that thrive only when planted in specially prepared soil. As a rule, strong growers that are not free flowerers will, if grown in peat, produce wood rather than bloom, flowers being more favoured by a loamy soil. For many tropical plants a mixture of loam, peat, leaf-mould in equal parts with sand added is suitable.

Potting.—The plants should be repotted in the spring. A few, such as Croton, Allamanda and Bougainvillea, are benefited by the use of a little decayed manure, but generally it should not be mixed in the soil, manure-water, which is quick in its action, being preferable. With few exceptions, stove plants do not require to be potted so firmly as those that grow in a lower temperature.

Training, Pruning, &c.—Plants that have a natural disposition to upright growth, and that flower from the extremities of the shoots, should not be trained until their blooms are set, after which they can be put into the required shape. As to training in general, it is well to be guided by the habit of the plant; such as are naturally spreading are less likely to be in any way injured by being trained in a bush-like form. The greater number of plants that are grown in heat may be freely cut back a little before active growth commences. Plants thus treated should be kept close and a few degrees warmer to induce a vigorous break. When the new growths are half an inch or so long the plants

may be shaken out and repotted into new soil.

Firing and Air-giving.—In the cultivation of stove plants much depends upon judicious firing, especially in spring. In March and April the sun is often very hot when cold cutting winds prevail; and if the fires are not stopped sufficiently early in the morning full advantage of the sunlight and heat cannot be taken, as it necessitates either too much shading or the admission of air to keep down the temperature, which is injurious to the young tender foliage, and crippled leaves, stunted growth, and the certain appearance of red spider are the consequences. As the season advances, and the difference between the external air and that in the house is less, more air may be given, never, however, in such quantities as to overdry the atmosphere.

Watering and Syringing.—Morning is the best time to give water to the roots. Syringing should be always done sufficiently early in the afternoon to admit of the leaves getting moderately dry before darkness sets in, as wet foliage with a falling temperature is not good for plants. If possible, the syringing should be done immediately before the house is closed, and so as to catch a little sun-heat, the condition to be aimed at being, say, a rise of temperature 10° through closing, when the syringing does most good. Manure-water should only be given when the pots are filled with roots.

Insects.—It is difficult to keep a mixed collection of stove plants clean, the conditions being favourable to insect pests. Mealy-bug, white and brown scale, thrips, aphides, red spider, and ants are ever at work, and must have no quarter. The best time to attack them is in the autumn, when the wood and leaves are matured, and able to bear whatever insecticides are used. If plants get badly infested, it often pays to burn them and start afresh.

LIST OF STOVE PLANTS

In addition to the tropical plants dealt with specially in the chapter on "Popular Garden Plants", the following are known to be in cultivation in gardens.

ACALYPHA.—Most of the species are compact shrubs with variegated leaves; of these *A. Chantrieri*, *A. Godseffiana*, *A. marginata*, and *A. Wilkinckii* are the best. *A. hispida* (Sanderi) is a robust shrub with large cordate green leaves and numerous axillary tail-like tassels of bright-crimson flowers.

ÆCHMEA.—Compact-growing plants related to the Pine-Apple. Loam or peat. Suckers. *Æ. fulgens* produces handsome spikes of scarlet and black flowers in July or August. *Æ. Mariæ Reginae* is a larger grower, with very handsome rosy bracts in April and May. *Æ. Lalindei*, crimson bracts, forming a fine plant. *Æ. Lindeni*, yellow flowers with red bracts. *Æ. Veitchii*, scarlet flowers and bracts.

ÆSCHYNANTHUS.—Free-growing little shrubs with fleshy leaves and handsome flowers produced on the ends of the shoots. Peat. Cuttings.

Æ. Lobbiana has a drooping habit, and bears pretty scarlet blooms set in purple cup-like calyces; suitable for a hanging basket. Spring. *Æ. speciosa* is a stronger grower, of more upright habit, bearing large terminal bunches of bright-red flowers. Summer and autumn.

ALLAMANDA.—Large, vigorous, strong-growing summer-flowering climbers. Loam. Cuttings. *A. Hendersoni* has enormous yellow blooms. *A. grandiflora* is a smaller, more compact-habited plant, with pale-yellow flowers. *A. nobilis* is a strong grower, with large, handsome, pale-yellow blooms; *A. Williamsii* is shrubby; *A. violacea* has purple flowers.

ALOCASIA.—A large genus of tropical Aroids, the leaves of some attaining considerable dimensions; they thrive in a humid atmosphere, and shade. Peat and loam. Division, suckers, or offsets. *A. Cheloni* and *A. Sedeni* are garden hybrids, with bronzy-green leaves, with white veins, reddish-purple beneath. *A. illustris* has large bright-green leaves, marked with patches of dark-olive. *A. Lowii*, leaves on stout stalks, large and of a beautiful deep-green, with ivory-white midrib and veins. *A. macrorrhiza variegata* has a stout stem and very large, pale-green and white leaves. *A. metallica*, leaves large, shield-like, smooth, and shining, the colour deep olive-green, suffused with bronzy-red above, and underneath reddish-brown. *A. Sanderiana*, leaves long and sinuous in outline, deep-green, midribs and margins white, *gandavensis* being a magenta-tinted form of it. *A. Thibautiana*, leaves large and handsome, olive-green, with grey ribs. *A. Veitchii* is in the way of *A. Lowii*, green, with a metallic shade like polished steel. *A. Watsoniana*, one of the largest, leaves a yard in diameter, olive-green with darker veins, purplish beneath. *A. zebrina*, leaves handsome, large, and arrow-shaped, with stout stalks, which are pale-green, banded with dark-olive.

ALPINIA VITTATA. Stems a yard high, bearing lance-shaped leaves, pale-green in colour, striped with creamy white. Loam. Division.

AMASONIA CALYCINA (punicea).—An erect shrub, with lanceolate green leaves, and terminal spikes of yellow flowers with conspicuous crimson leafy bracts. Loam and peat. Cuttings.

AMHERSTIA NOBILIS.—A magnificent tree Legume, bearing in spring large drooping racemes of vermilion and golden-yellow flowers; requires plenty of head-room in a hot, moist, shaded house. Loam. Cuttings.

AMORPHOPHALLUS CAMPANULATUS is worth growing for the sake of its large umbrella-like leaf and mottled stalk. It has a large fleshy tuber and a huge purple-brown flower of extraordinary form and disagreeable odour. Should be rested in winter. Prefers plenty of heat and moisture. Other species are grown in Botanic Gardens.

ANANASSA SATIVA VARIEGATA.—A variegated form of the Pine-Apple, green and creamy-white, tinged with red in about equal proportions. Loam. Suckers. *A. Porteana* is another form of it.

ANTHURIUM.—A large and varied genus of South American Aroids. *A. Scherzerianum* (fig. 159) has erect lanceolate leaves and scarlet banner-like flowers. There are many varieties of it. *A. Lindenii*, a tall, sturdy plant, has cordate leaves and large white spathes. *A. Andreanum* has tall stems, heart-shaped leaves, and large wrinkled blood-red spathes with curled yellow spadices. Many hybrid forms have been raised from the

two last-named, some with large white, pink, or deep-crimson spathes. *A. magnificum*, *A. Warocqueanum*, and *A. crystallinum* are handsome foliage plants. *A. Veitchii* has leaves 3 to 4 feet long,



Fig. 159.—*Anthurium Scherzerianum*

deep-green, the nerves arched and deeply sunk, giving them a very distinct appearance. Peat loam and sphagnum. Seeds and division.

APHELANDRA.—Of somewhat spare erect habit, with little disposition to branch. Peat. Cuttings or seeds. *A. tetragona* produces in autumn large upright spikes of deep-orange-coloured flowers. *A. Roeslii* has deep-green shining leaves and fine heads of bright-red flowers. *A. pectinata* and *A. squarrosa* are good winter-flowering shrubs.

ARALIA.—Handsome shrubs, with elegant foliage. Peat and loam. *A. Guilfoylei*, pinnate leaves, serrated on the edge, and margined with white. *A. reticulata* has long narrow leaves, prettily veined. *A. elegantissima* has palmate leaves, with serrated leaflets. *A. Veitchii* is of very slender habit, with elegant palmate foliage; *gracillima* is a form with very narrow leaflets. *A. Chabrieri* has leaves a foot long, deep-green, with crimson midrib. *A. Kerchoviana* has digitate deep-green leaves. *A. leptophylla*, dark-green, finely-cut, slightly pendent leaves. Cuttings or grafts.

ARDISIA CRENULATA.—Small and erect in habit, bearing bunches of bright-red berries that remain long upon the plant; *alba* is a white-berried form. Loam. Seeds and cuttings.

ARISTOLOCHIA.—Mostly strong growing climbers, producing large, very singular-shaped flowers, and requiring a considerable amount of room. Peat or loam. Cuttings. *A. Gigas Sturtevantii* has very large, long-tailed flowers, creamy-white mottled with brown. *A. ornithocephala* has smaller blooms, of a yellow and brown

colour. *A. Goldieana* (fig. 160), flowers very large, greenish outside, internally yellow, with chocolate veins. *A. elegans*, a handsome species, rich maroon-purple internally, marked with white lines.



Fig. 160.—*Aristolochia Goldieana*

ASPIDISTRA LURIDA.—A few pots of this should be in every stove collection, as it is most useful for general furnishing purposes.

ATACCIA CRISTATA.—Large, ovate, wrinkled leaves, like a gigantic Plantain, with tall, graceful spikes of Cat-head-like flowers coloured brown-purple. Fibrous peat. Division.

BERTOLONIA.—Dwarf plants, a few inches in height, the leaves prettily marked. *B. superbissima* has leaves olive-green, spotted with reddish-pink. *B. Van Houttei* has leaves veined and spotted with carmine. *B. margaritacea superba*, *B. guttata*, and *B. punctatissima rosea* are others. Cuttings or seeds.

BILLBERGIA.—Pine-Apple-like plants, with tall spikes of usually bright-coloured flowers and large, conspicuous bracts. There are many species, of which *B. Bakeri*, *B. Liboniana*, *B. mutans*, *B. Porteana*, *B. pyramidalis*, *B. speciosa*, *B. thyrsioidea*, *B. vittata*, and *B. zebrina* are good. Peat. Suckers.

BOUGAINVILLEA.—Strong, free-growing, profuse-flowering plants, suitable for draping pillars or as pot-shrubs. Loam or peat. Cuttings. *B. glabra* is the freest, colour rosy-mauve. *B. Sanderiana* is a very free-flowering form, with mauve bracts. *B. spectabilis* is a stronger grower, with large deep-mauve flower-bracts. There are several other colour varieties of which Mrs. Butt is the best, the bracts being deep crimson.

BROWNEA.—Tall plants, suitable only for large houses. They have large pinnate leaves and globose head of bright-red flowers. *B. coccinea*, *B. Crawfordii*, *B. grandiceps*, and *B. macrophylla* are the best. Loam. Cuttings.

BRUNFELSIA (Franciscea).—Shrubs with leathery leaves and flat Pansy-like flowers, usually purple or blue. Loam and peat. Cuttings. *B. Americana*, *B. calycina* (including numerous garden forms named *augusta*, *eximea*, *macrantha*, *violacea*, &c.), *B. latifolia*, and *B. nitida* are the best. May be grown in pots or planted out in a border.

CALATHEA.—Often confused with *Maranta*, but distinguished by its short globose flower-heads. Many of the species are cultivated for their prettily variegated foliage. Some of the best are *C. argyrophylla*, *C. eximea*, *C. illustris*, *C. fasciata*,

C. leopardina, *C. Lindeniana*, *C. medio-picta*, *C. princeps*, *C. Sanderiana*, *C. Veitchiana*, and *C. zebrina*. Division.

CARAGUATA.—A genus of Bromeliads, with elegant smooth foliage and central pyramidal heads of bright-red flowers. *C. Andreana*, *C. cardinalis*, *C. conifera*, *C. Melinonis*, *C. Morremiana*, and *C. Zahni* are the best. Suckers.

CEROPEGIA.—African climbing plants with thin stems, fleshy leaves, and urn-shaped flowers of fantastic structure. *C. africana*, *C. Barklyi*, *C. elegans*, *C. stapeliiformis*, and *C. Woodii* are in cultivation. Loam and peat. Cuttings.

CISSUS (now included in *Vitis*), free-growing climbers, suitable for covering a wall or trellis. Loam. Cuttings. *C. discolor* has velvety-purplish leaves, marbled with white, and shaded with pink. *C. argentea* has leaves prettily marbled with silvery-grey.

CLERODENDRON.—Shrubby plants, others of twining habits; all good growers and free-flowering. Loam. Cuttings and seeds. *C. fallax* has spreading ample foliage, and large panicles of bright-scarlet blooms. *C. fragrans* is moderate in growth, and has white flowers tinged with red. *C. Thomsonae* (Balfour) is suitable either for a pillar, rafter, or as a trained pot specimen; flowers deep-red, with pure-white calyces produced in the greatest profusion, and lasting for several weeks during the summer. *C. splendens* is of similar habit, but has rich-crimson flowers produced in winter. *C. speciosum* is a hybrid between these two.

COLUMNEA.—Gesneriads from South America. Of spreading habit with fleshy leaves, and bearing during the summer numerous tube-shaped scarlet flowers. The best of them are *C. glabra*, *C. gloriosa*, *C. magnifica*, *C. scandens*, and *C. rotundifolia*. Sandy peat. Cuttings.

COMBRETUM PURPUREUM is a handsome evergreen climber of moderate growth, producing

large racemes of intense purplish-crimson flowers in July. Peat. Cuttings.

COSTUS.—Several species are worth growing, especially *C. igneus*, which has stems a foot high, round, fleshy, hairy leaves, and large, flat, golden-orange flowers. Division.

CRINUM.—A large genus of bulbous plants, chiefly tropical. They require plenty of light at all times, and should be watered freely whilst growing, afterwards resting them for two or three



Fig. 161.—*Cyrtosperma Johnstonei*

months. The best for garden purposes are *C. amabile*, *C. asiaticum*, *C. Augustum*, *C. brachynema*, *C. giganteum*, *C. latifolium*, *C. Sanderianum*, and *C. zeylanicum*. Loam. Seeds and offsets.

CURCULIGO RECURVATA VARIEGATA.—A broad-leaved grass-like plant a yard high, the leaves plaited, gracefully curved, green striped with white. Loam. Division.

CYANOPHYLLUM MAGNIFICUM.—A noble plant with immense velvety ribbed leaves, rich olive-green on the upper side, the under surface pale-red. Peat and loam. Cuttings.

CYRTOSPERMA JOHNSTONEI (fig. 161).—A remarkable Aroid from the Solomon Islands with spiny leaf stalks and a dark-purple spathe. Sub-aquatic.

DALECHAMPIA ROEZLIANA.—A free-growing plant of dwarf, bushy habit. The flowers are subtended by large pale-pink bracts, produced in May and June. Peat or loam. Cuttings or seeds.

DIFFENBACHIA.—The "Dumb-Cane". Stems stout, succulent; leaves large, ornamental. Loam. Cuttings. The best sorts are *D. Bowmanni*, *D. Baraquimiana*, *D. brasiliensis*, *D. Carderi*, *D. grandis*, *D. illustris*, *D. Jenmani*, *D. Leopoldi*, *D. nobilis*, *D. picta* (Bausei), *D. Weiir superba*, *D. Memoria-Corti*, *D. robusta*.

DIPLADENIA.—Twining plants, suitable for rafters or to be trained as pot specimens, flowering freely in summer. Fibrous peat. Cuttings. *D. Brearleyana*, flowers rich-crimson. *D. amabilis*, flowers of a purplish-crimson colour. *D. splendens*, flowers delicate blush, with a deep rose-coloured throat. *D. boliviensis*, white, with deep-yellow throat. *D. atropurpurea*, short growth, small leaves, flowers crimson-purple. *D. eximea*, *D. illustris*, *D. Sanderi*, *D. splendens*, and *D. speciosa* are other garden sorts.

EPISCEA (Cyrtodeira).—A small genus of herbaceous trailers with handsome foliage and bright-red flowers. Will grow in any shady moist corner. Useful also for baskets. *E. chontalensis*, *E. fulgida*, and *E. maculata* are the best.

ERANTHEMUM.—A useful genus of stove Acanthads, flowering in winter. They are easily managed, free, and pretty. Ordinary soil. Cuttings in spring. The best are *E. Andersoni*, *E. cinnabarinum*, *E. igneum*, and *E. nervosum* (pulchellum).

ERYTHRINA.—A large genus of tropical shrubs and trees, with pinnate, deciduous leaves, and large racemes of bright-scarlet flowers. *E. Parcelli* and *E. marmorata* are grown for their variegated foliage. Loam.

EUPHORBIA JACQUINIEFLORA (fulgens) has long, slender, erect shoots, with Willow-like foliage and intense scarlet flowers produced in clusters in the leaf-axils in winter. *E. splendens* is a branched, dense-habited spiny plant that produces all the year round small bunches of bright-scarlet flowers.

EXACUM MACRANTHUM is a shrubby biennial Gentian, with stems 18 inches high, opposite ovate leaves, and terminal clusters of large rich purple-blue flowers with yellow anthers. Peat and leaf-soil. Seeds. Prefers shade.

FICUS.—The "India-Rubber", *F. elastica*, is well known as a valuable decorative plant. Var. *variegata* is freely blotched with cream-colour. *F. nymphaefolia* has large green heart-shaped leaves. *F. lyrata* is a tall shrub with large fiddle-shaped leaves. *F. repens*, *F. minima*, *F. radicans*, both green and variegated, and *F. falcata* are small self-clinging trailers, useful for covering walls, &c. *F. Canoni* (*Artocarpus*) has bronzy-purple leaves. Loam. Cuttings.

FITTONIA.—Pretty free-growing trailers. *F. Pearcei* and *F. Verschaffeltii* have dark-green leaves with red reticulations; *F. argyroneura* is green with white reticulations. Suitable for baskets. Peat. Cuttings.

GARDENIA.—Useful shrubs with deep shining green leaves, and mostly creamy-white, highly fragrant flowers. Peat. Cuttings. *G. florida* and its varieties *Fortunei* and *radicans* are well known. They may be grown so as to be in flower all the year. *G. Stanleyana* has long-tubed white maroon-spotted flowers produced in May from the axils of the young leaves.

GESNERA.—Tuberous-rooted summer-flowering plants, of dwarf growth, the leaves as well as the flowers of some being remarkably handsome. They require the same treatment as Gloxinia. Cuttings or seeds. *G. cardinalis*, bright-crimson long-tubed flowers; *G. Cooperii*, intense scarlet; *G. Donklarii*, deep-crimson; *G. exoniensis*, deep-orange in large panicles; *G. refulgens*, rich dark-red; *G. nageloides*, pink flushed with red; of this there are numerous garden varieties, such as *bicolor*, *candida*, *corallina*, &c. *G. Leopoldii*, velvety leaves, crimson and brown flowers.

GLORIOSA (*Methonica*).—Tuberous-rooted plants of climbing habit, bearing Lily-like flowers, with narrow reflexed petals, of a golden-yellow and red colour. Summer. *G. Carsoni*, *G. Rothschildiana*, *G. grandiflora*, *G. virescens* (*Plantii*), and *G. superba*. Loam.

GRIFFINIA.—Brazilian bulbous plants, with ovate leaves and erect, stout stems, bearing umbels of beautiful lilac and white flowers. *G. hyacinthina* and *G. ornata* are in cultivation. They require the same treatment as *Eucharis*. Autumn. Loam. Offsets.

HOYA.—Twining plants, producing handsome wax-like flowers on short persistent axillary stalks. Peat. Cuttings. *H. carnosa* is as free as Ivy, and flowers profusely in any moist, shady corner. *H. imperialis* has ample, thick, leathery leaves and large straw-coloured flowers borne in large bunches. *H. bella* is a slender, small-leaved plant, of drooping habit, bearing lovely balls of flowers, white, with pink centre, and is best grown in a basket. *H. Paxtoni* is a form of it. *H. multiflora* (*Centrostemma*) is a compact little shrub, with bunches of straw-yellow flowers.



Fig. 162.—*Impatiens Herzogii*

HÆMANTHUS.—African bulbous plants, with fleshy, green leaves and usually large drum-stick-like flowerheads. They like a dry, sunny place. *H. carneus*, bright-pink; *H. cinnabarinus*, bright-red; *H. Katherinæ*, handsome heads of bright-scarlet flowers; *H. magnificus* and varieties *insignis* and *superbus*; *H. multiflorus* (*Kalhbreyeri*), and *H. Lindenii*, are deciduous species, with bright-crimson flower-heads. Offsets. Loam and peat.

HEXACENTRIS (*Thunbergia*) **MYSORENSIS**.—A robust climber, with drooping racemes of beautiful red and yellow flowers. Summer. Peat and loam. Cuttings.

HIBISCUS.—Free-growing plants, of vigorous habit. Loam. Cuttings. *H. rosa-sinensis* has large deep-scarlet flowers; there are many named varieties of it. *H. Archeri* is a hybrid between *rosa-sinensis* and *schizopetalus*, and exactly intermediate in character. *H. Manihot* is a robust shrub, with large lobed leaves, and enormous primrose-yellow flowers with a large eye-like blotch of maroon. *H. schizopetalus* is in the way of *H. rosa-sinensis*, but with long-stalked, drooping, lacinated flowers.

HYMENOCALLIS.—A genus of easily-grown bulbous plants, requiring rich loam, leaf-mould, and sand. *H. fragrans*, pure-white; *H. macrostephana*, long, arching leaves and great heads of pure-white flowers; *H. speciosa*, pure-white, very sweet-scented in the evening; *H. littoralis*, narrow leaves and tall scapes of elegant white, fragrant flowers.

IMPATIENS.—Free-growing herbs with pretty flowers: *I. Hawkeri*, dark-red; *I. Herzogii* (fig. 162) is similar, but has glabrous stems and leaves and vermillion coloured flowers; *I. Sultani*, scarlet; *I. Holstii*, scarlet; *I. platypetala*, mauve, and variety *alba* are all showy.

IPOMÆA.—Summer-flowering twiners, of free growth. Sandy loam. Cuttings and seeds. *I. Learii* is a strong grower, requiring plenty of room; the flowers large, trumpet-shaped, deep-blue. *I. Horsfalliae* has large clusters of beautiful rose-crimson blossoms, produced in autumn; var. *Briggsii* has smaller flowers coloured cerise. Some of the annual species are worth growing in the stove, especially *I. Dona-nox*, with very large white flowers, open at night; *I. rubro-cærulea* and *I. Quamoclit*.

IXORA.—Gorgeous-flowered evergreen shrubs of compact bushy habit. Cuttings. Peat and loam, requiring plenty of heat. *I. coccinea* has heads of bright-scarlet flowers. The following are garden forms of it: *Dixiana*, orange; *Fraseri*, bright-scarlet; *grandiflora*, *incarnata*, flesh-coloured; *lutea*, yellow; *Pilgrimi*, orange-scarlet; and *Westii*, compact, with rounded corymbs of bright-red flowers. *I. macrothyrsa* (*Duffii*) has heads of crimson flowers nearly a foot across; the shoots of this should not be stopped, as when they grow to a length of 3 to 5 feet they produce enormous flower-heads. *I. javanica* is of more slender habit, with paler green foliage, and bright orange flowers in June and July. *I. salicifolia* has narrow lance-shaped leaves and orange-coloured flowers.

JACOBINIA.—Free-growing shrubby Acanthads. Cuttings in early spring. Loam and leaf-mould. The best sorts are *J. chrysostephana*, yellow; *J. coccinea*, red; *J. magnifica*, and its varieties *carnea* and *Pohlana*. These plants are also known as *Justiceas*.

JASMINUM.—Some of these are worth a place in the stove. The best are *J. gracillimum*, with compact heads of white, fragrant flowers; *J. Rex*, the largest flowered species, from Siam; *J. Sambac florepleno*, double white.

KEMPFERIA (including *Cienkowskia*).—Ginger-like plants, variable in foliage, some being prettily variegated. Light soil. Division. *K. Kirkii* has racemes of flowers resembling *Miltonia vexillaria*. *K. Ethelia* has larger flowers than *K. Kirkii*. *K. Roscoeana* has rose-coloured bracts and yellow flowers.

KARATAS (*Nidularium*).—Pine-Apple-like plants, some of which are distinct and handsome in flower. Loam. Suckers. *K. fulgens* produces from the centre a head of deep-red flowers. *K. Laurentii*, flowers blue. *K. Legrellæ*, flowers purple and white, bracts rose-tinted. *K. spectabilis*, a truly handsome species, leaves tipped with red, flowers bluish and white.

MANETTIA.—Slender climbers, with thin shoots and axillary flowers. Light loam. Cuttings. *M. cordifolia* has thin cordate leaves, and tubular red flowers; *M. luteo-rubra* (*bicolor*) has ovate thick leaves, and urn-shaped scarlet and yellow tubular flowers. They grow best on a trellis.

MARANTA.—Often confused with *Calathea*, from which it differs in its zigzag stems and small unattractive flowers. Some of the *Calatheas* are known in gardens as *Marantas*. *M. arundinacea*, the Arrowroot, is typical, the plant known as *Phrynium variegatum* being merely a variegated form of it. Other species worth growing for their foliage are *M. amabilis*, *M. bicolor*, and its varieties *Devosiana*, *Kerchoveana*, *Makoyana*, and *Massangeana*, *M. musaica*, and *M. Sagoreana*. They all like light rich soil, plenty of heat and moisture, and shade. Division.

MARCGRAVIA.—Climbers of Ivy-like habit, the juvenile stage having ovate leaves and clinging as Ivy does, whilst the mature stage has lanceolate leaves and does not cling. *M. umbellata* (*dubia*) is an excellent plant for clothing a wall or pillar. Loam. Cuttings. The plant grown in gardens as *M. paradoxa* is *Monstera tenuis*, an Aroid.

MARICA.—Flag-like plants, thriving in a shady, moist position, useful for furnishing out-of-the-way places. *M. cœrulea*, blue and gold, *M. gracilis* and *M. Northiana*, yellow and purple, are the best. Division.

MEDINILLA.—Strong-growing shrubs, with usu-

ally broad, leathery leaves, and bunches of handsome flowers. Loam. Cuttings. *M. magnifica* bears rosy-pink flowers in large drooping panicles in May. *M. amabilis* is similar in growth and flowers, but has erect instead of drooping panicles. *M. Curtisii* is a smaller species, with pendulous branchlets, producing clusters of ivory-white flowers.

MIMOSA PUDICA, the "Sensitive plant", should be raised annually from seeds and grown on singly in 4-inch pots. It is most sensitive when grown in a hot, moist, rather shaded position. Loam.

MONSTERA DELICIOSA.—An Aroid, with stout, fleshy, climbing stems and large leathery heart-shaped leaves, with numerous slit-like perforations. The spathe is 8 inches long, fleshy, white, and boat-shaped. The long cone-like spadix is edible. Loam. Cuttings. *M. tenuis* (*Marcgravia paradoxa*) has clinging stems and ovate leaves until it gets to a considerable height, when the leaves are much larger and pinnate. It is an excellent wall-plant.

MUSA.—Worth growing in large houses for the sake of their noble foliage. *M. sapientum*, the Banana, of which there are many varieties, should be grown both for its leaves and fruits. Some of the forms have stems 9 to 12 inches in diameter, and grow 20 to 25 feet high. *M. Cavendishiana* has stems about 6 feet high, and sometimes produces clusters of fruit weighing over half a cwt. *M. coccinea*, *M. rosea*, and *M. rubra* are smaller species with erect flower-spikes clothed with large bright-red or rose-coloured bracts; *M. superba* is a bulbous-stemmed deciduous species about 6 feet high; *M. Ensete* has a short stem, and leaves from 15 to 20 feet long; it does best in a cool house. *M. vittata* has variegated leaves; *M. sumatrana* and *M. zebirina* have bands of brown-purple on their leaves. They all like a well-manured loamy soil. Suckers or seeds.

MUSSÆNDA FRONDOSA.—A low spreading bush, bearing on the young shoots bunches of small yellow flowers and large white bracts. Loam. Cuttings.

PANDANUS.—The Screw-Pines when small are useful for general decoration, and when room can be afforded they are noble plants when large. They are easily grown and most of them produce offsets freely. They like a rich soil and plenty of water. *P. graminifolius* is dwarf, branching freely horizontally, the leaves narrow and grass-like; *P. inermis*, also known as *amaryllidifolius*, has green spineless leaves, *Baptistii* is a variegated form of it; *P. discolor*, bronzy-green; *P. javanicus*, silvery and green, very spiny; *P. pacificus*, short, broad, bright-green leaves; *P. Sanderi*, leaves green with broad stripes of cream-yellow; *P. utilis*, green with dark-brown margins; *P. Veitchii*, the most popular of all, green, with stripes of white.

PASSIFLORA.—A large genus of useful climbers, of easy culture, and usually very free-flowering. Suitable for pillars, roofs, walls, &c. They should be planted out if possible. In early spring the shoots should be cut back to spurs. *P. alata*, large entire leaves, and fleshy-pink and purple flowers, succeeded by large edible fruits; *P. Bellottii* and *P. Buonaparteana* are not unlike the last, being hybrids between it and *P. quadrangularis*; *P. cœrulea* does well in a warm house; *P. edulis*, the "Granadilla", worth growing for its delicious purple Plum-like fruits; *P. macrocarpa* (fig. 163) like the first-named, but with fruits as large as a Melon; *P. racemosa* (*princeps*), pendent

racemes of bright-scarlet flowers; *P. Raddiana* (*Kermesina*), one of the prettiest, the flowers bright-crimson and purple; *P. trifasciata*, remarkable for its velvety variegated leaves; *P. Watsoniana*, not unlike *P. Raddiana*, but with lilac-purple flowers, deliciously fragrant.

PAULLINIA THALICTRIFOLIA.—A graceful scandent shrub, with thin stems bearing numerous leaves, elegantly divided. May be grown on a small trellis or pillar, or if kept pinched in, it forms a pot-shrub. Loam and peat. Cuttings.

PELLIONIA.—A small genus of the Nettle

leaflets ovate, leathery; *P. pulcher* (*Reidia glaucescens*), leaves herbaceous, pale-green; and *P. nivosus*, leaves white and green. Cuttings.

PHYLOTENIUM, or *Xanthosoma Lindenii*, is like an *Alocasia*, but has thicker sagittate leaves, bright-green, with broad silvery bands along the midrib and veins. It likes plenty of heat and moisture and an open peaty soil.

PITCAIRNEA. A large genus of Bromeliaceæ with tufted foliage, usually long and grass-like, and long, arching branched scapes of red, white, or yellow tubular flowers. Peat and leaf-mould. Seeds or division. Some of the best species are *P. albiflos*, *P. angustifolia*, *P. aphelandraeflora*, *P. corallina*, *P. maidifolia*, *P. muscosa*, *P. recurvata*, *P. Roeslii*, *P. staminea*, and *P. xanthocalyx*.

RONDELETIA SPECIOSA.—A compact, small-leaved bush, bearing bunches of bright-red Verbena-like flowers in June, and lasting two months. Peat and loam. Cuttings.

ROUPALA (*Rhopala*).—Distinct and handsome stove plants. Fibrous loam and peat. Cuttings. *R. elegans*, *R. Pohlii* (*aurea* and *corcovadensis*), and *R. Vervaineana* all have the habit and foliage of an Ash-sapling, but they are covered with soft hairs, and coloured dark-green and brown. Useful either as pot-plants or planted out.

RUSSELLIA.—Elegant scandent little plants, the branches suggestive of the Mare's-tail (*Equisetum*). The leaves are small, and the tubular bright-red flowers are borne profusely all over the plant. Most suitable for a basket or pillar. *R. juncea* and *R. sarmentosa* are the two species, and from these a race of pretty hybrids have been raised; they are named *elegantissima*, *Lemoinei*, &c.

SAINTPAULIA IONANTHA.—A delightful little Gesneriad, with the habit of a Violet. It forms rosettes of spoon-shaped, fleshy, dark-green leaves, and produces clusters of short-tubed, purple-blue flowers in great profusion; there is a variety with white flowers. May be grown in any position almost, even in the gravel on the stages.

SANCHEZIA NOBILIS.—A stout branching bush, easily grown and very handsome; leaves deep-green, midrib and veins bright yellow. Flowers tubular, rich yellow. Loam. Cuttings.

SANSEVIERIA.—Singular-looking plants, their leaves, which spring from a stout rhizome, being either cylindrical, keeled, or strap-shaped, and marked zebra-like with grey and green. They yield excellent fibre. The best for decoration are *S. cylindrica*, leaves a yard long and tough as india-rubber; *S. guineensis* (*thyrsiflora*) has flat erect leaves 2 to 4 feet high; *S. Laurentii* is a variety of it with yellow variegation; *S. Kirkii* has thick channelled leaves, 6 feet or more long.

SCUTELLARIA.—Quick-growing herbaceous plants which form shapely specimens with a little stopping of the shoots, and they flower freely. *S. coccinea*, *S. Mocimiana*, and *S. Ventenatii*, all scarlet-flowered, should be in every stove collection. Light loam and leaf-mould. Cuttings.

SOLANDRA GRANDIFLORA is a very robust climber, with fleshy branches and leaves, and large tubular white flowers, not unlike those of a *Datura*, changing to a cream-yellow with age. An excellent plant for a sunny position on a rafter or pillar in a large house. Cuttings.

SONERILA.—Small herbaceous plants, with ovate leaves more or less spotted with silvery-white on a bright-green ground. They are excellent for



Fig. 163.—*Passiflora macrocarpa*

family, but the relationship is evident only in the flowers, the stems being trailing, and the leaves ovate, fleshy, smooth, and prettily marked with grey and metallic-green. *P. Daveauana* and *P. pulchra* are worthy garden plants. Cuttings.

PENTAS CARNEA.—A soft-wooded shrub of low spreading habit, free-growing, and producing abundant corymbs of pretty lavender-coloured flowers at any time of year. Loam. Cuttings.

PHILODENDRON.—Aroids of trailing or scandent habit, some of them with very large leaves. Excellent for clothing pillars and walls in large houses, or for draping rafters. The best are *P. Andreanum*, *P. Corsianum*, pale-green and bronze; *P. Carderi* (*verrucosum*), *P. crinitum* (*squamiferum*), *P. erubescens*, *P. gloriosum*, *P. lacinosum* (*quercifolium*), *P. Mamei*, *P. Martinetti*, *P. ornatum*, *P. Selloum*, and *P. Wallisii*. They like shade, plenty of moisture and heat. Some of them have handsome flowers.

PHYLLANTHUS.—Pinnate-leaved shrubs which produce small white or reddish flowers along the margins of the leaflets. Easy to grow in an ordinary stove. *P. angustifolius*, with long leaflets coloured dark-green; *P. epiphyllanthus* (*falcatus*), leaflets lanceolate, rather rigid; *P. latifolius*,

baskets or pans. When well grown they produce bright-pink flowers abundantly. *S. margaritacea* and *S. maculata* are the two species, and from these several well-marked hybrids have been raised. Peat. Cuttings.

SPATHIPHYLLUM.—Elegant Aroids related to Anthurium. They have long-stalked oblong green leaves, and tall slender scapes, bearing white spathes. They like the same treatment as Anthurium. The best are *S. blandum*, *S. candidum*, *S. cannefolium*, *S. Harveyanum*, *S. Patini*, and *S. pictum* (variegated).

SPHÆROGYNE LATIFOLIA.—A Melastoma related to Cyanophyllum, with magnificent deep-green velvety-ribbed leaves. Peat and loam. Cuttings.

STEPHANOTIS FLORIBUNDA.—A robust twiner, with deep-green ovate foliage of leathery substance, from the axils of which the tubular, white fragrant flowers are borne freely in large bunches. Loam and peat. Cuttings.

TABERNÆMONTANA CORONARIA FLORE-PLENO.—A Gardenia-like shrub of medium size and free-growing habit; the flowers, which are double and pearly-white, are borne on the young shoots in July. Peat and loam. Cuttings.

THUNBERGIA.—Vigorous twining plants. Loam. Cuttings. *T. grandiflora* produces in the summer a succession of large racemes of large pale-blue flowers; var. *alba* has milk-white flowers. *T. laurifolia* (Harrisii) is similar. *T. alata*, with handsome black-eyed buff flowers, is a free-flowering stove annual. *T. affinis*, a more shrubby plant, with purplish-violet flowers with yellow throat, and *T. (Meyenia) erecta*, with its variety, *aba*, form shapely little shrubs.

THYRSACANTHUS RUTIIANS.—An erect, rather leggy plant, with lanceolate leaves, and in winter numerous elegant, long, drooping panicles of bright-crimson tubular flowers. Loam. Cuttings.

TILLANDSIA (including *Vriesia*).—A large genus of Bromeliaceæ, comprising plants of very varied size and habit, from *T. Regina*, of the dimensions of the American Aloe, to the pigmy *T. ionantha*, which might be hidden in a Walnut shell. The Spanish Moss or Old-Man's Beard, *T. usneoides*,

is another extreme form. Some species never develop roots, their duties being apparently performed by the leaves. Peat and leaf-mould. Suckers and seeds. The following have handsome flowers: *T. cardinalis*, *T. corallina*, *T. Devansayana*, *T. Duvaliana*, *T. gloriosa*, *T. hieroglyphica*, *T. Lindeni*, var. *vera*, *T. psittacina*, *T. Poelmani*, *T. Rex*, *T. splendens* (zebrina), *T. tessellata*, and *T. Vigersii*.

TORENIA.—A genus of herbaceous trailers, which are best raised from seeds in early spring and treated as recommended for Achimenes. They are useful for edging borders or to furnish the front of stages. Also excellent basket plants. The sorts grown are *T. asiatica* and *T. Fournieri*, blue and purple; and *T. flava*, yellow.

TOXICOPHLEA (Acokanthera) SPECTABILIS.—A sturdy evergreen shrub; the flowers, which are white, very fragrant, and clustered, are produced from the ends of the shoots and in the axils of the leaves in winter. Loam. Cuttings.

URCEOLINA AUREA.—A small bulbous plant related to Eucharis, but with smaller foliage than *E. grandiflora*, and scapes 6 to 9 inches high, bearing umbels of pendulous yellow and green urn-shaped flowers. When the leaves wither the bulbs should be rested on a dry shelf. *Urceocharis Cibrani* is a hybrid between this and *Eucharis grandiflora*. Peat and loam.

UTRICULARIA.—Remarkable little herbaceous plants, the roots of some of them bearing bladders which are utilized to trap insects as a source of food. The following have strap-shaped, ovate, or peltate leaves, and erect spikes of flowers. They all like to be grown in wet moss in shade. *U. Endresii* has rosy-purple flowers an inch across; *U. ionantha*, *U. longifolia* (Forgetiana), and *U. nelumbifolia*, bright-blue flowers, and *U. montana*, white flowers. The last-named is the easiest to cultivate.

VINCA ROSEA.—A free-growing herbaceous plant, about a foot high, bearing all through the summer from the points of the shoots pretty red-eyed flowers. The variety *alba* has white flowers. Loam. Cuttings.



Fig. 164.—Tropical Orchid House, Kew

ORCHIDS

GENERAL

Orchids are generally supposed to be difficult to cultivate; they are, however, with some exceptions, well within the means and skill of the expert grower, proof of which is seen in the rich collections of them which have been formed in this and other countries, even in or near large towns where good cultivation is hampered by unfavourable atmospheric conditions. It is thought by many that only a professional Orchid-grower can manage Orchids successfully, but any intelligent gardener who gives his mind to the subject will soon acquire the necessary skill to enable him to compete successfully with the specialist.

Orchids were formerly supposed to require great heat, and that supposition did much to prevent their becoming popular, those who essayed their cultivation being disheartened by the failure of many of the plants to thrive; hence the belief that they were difficult to grow. Experience has taught that temperate treatment generally

is most congenial to the majority of garden Orchids, whilst even those from the most tropical regions thrive in ordinary warm-house conditions.

Where excessively high temperatures are employed the damage is done chiefly in what ought to be the resting season, all Orchids requiring a rest, i.e. a reduced allowance of water and a lower temperature for a time, the length of time varying according to the nature of the species.

Much mischief has resulted from the belief that Orchids require special treatment. They constitute one of the largest orders of the vegetable kingdom, the different members of which in many cases require as widely different treatment as that necessary for the Pelargonium and the Stephanotis, the Cape Heath and the tropical Aroid. At the same time a selection of Orchids may be successfully grown in the same house with other plants, provided care is exercised to select such plants as require

similar conditions, and the accommodation afforded is likely to suit.

Whilst the culture of Orchids requires forethought and care in watering, resting, cleanliness, temperatures, shade, ventilation, &c., common sense enters largely into their treatment, and those who apply it will find that most difficulties disappear.

It will be well to briefly glance at the native habitats of the species composing some of the larger genera in order to perceive the importance of a knowledge of their cultural requirements. Of *Odontoglossums*, those that require the lowest temperature,

South America, we find in Costa Rica *Odontoglossum Kramerii*, *O. coronarium*, *O. Schlieperianum*, and others, which require a little more warmth in winter than the *O. crispum* section. Then in Guatemala, between 10° and 15° N. lat., *O. pulchellum*, *O. Uroskinneri*, and *O. grande*, and farther north the Mexican *O. bictoniense*, *O. nebulosum*, *O. cordatum*, *O. maculatum*, *O. Rossii*, *O. Cervantesii*, &c., occur. These prefer less moist conditions than the species from the South American continent, the upland plains and slopes which they inhabit being invariably swept by gentle breezes.

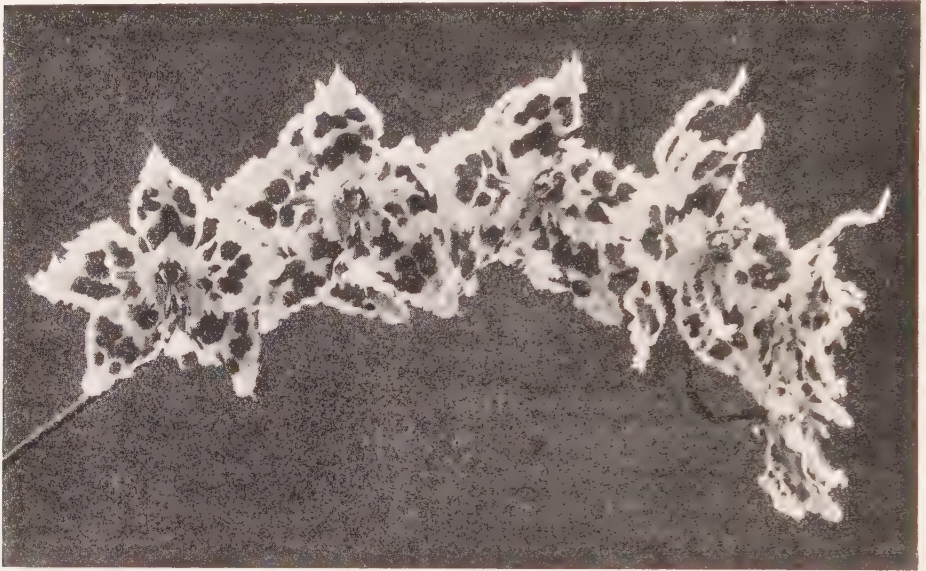


Fig. 165.—A Champion Spotted *O. crispum*

and of which *O. crispum* and *O. Pescatorei* are typical, are most abundant in the mountainous regions of the South American Andes, between Bogota and Ocaña, at an altitude varying from 5000 to 9000 feet, a humid temperate region with a mean annual temperature of a little over 55° for the higher elevation and 65° for the lower. The differences between the maximum and minimum temperatures sometimes are great, the thermometer in the heat of the day often rising to 90° , falling at night to 40° . From this fact may be deduced the importance, first, of a low night temperature, and secondly, that an occasionally high temperature in summer need not cause anxiety if the house is carefully shaded and ventilated, and the atmosphere kept moist.

Still following the mountain ranges of

Miltonia vexillaria and *M. Roezlii* inhabit the central and western slopes of the Western Cordillera of South America at the low elevation of 1000 to 2000 feet, which indicates that under cultivation they require more warmth in winter.

A study of the conditions under which *Cattleyas* and *Laelias* occur in nature will show why the majority of the species, although from districts so widely separated, may be successfully cultivated under the same conditions. They grow wild in the higher and cooler parts of the countries they inhabit; the Mexican *Laelias* (*L. anceps*, &c.) from 6000 to 8500 feet elevation, with an average mean temperature of 50° to 70° ; the Colombian *Cattleya Trianae*, *C. Mendelii*, &c., from 2000 feet to 5000 feet altitude, where they get full sun and a high tempera-

ture by day, falling to about 50° at night. This occurrence of a night temperature much lower than that of the day is general, and in the treatment of Orchids under cultivation this is very important, as it often makes all the difference between success and failure.

few also being natives of Japan and New Zealand. The name *Dendrobium* conveys little information as to the cultural requirements of the plants, but a knowledge of the conditions and temperature under which the species occurs is a safe guide to its cultivation. By separating them into three



Fig. 166.—*Lælia anceps alba*

The genus *Dendrobium* is represented in most countries in tropical Asia, including India, the Malay Archipelago, the islands of the Western Pacific, and Australia, a

or four groups, according to the temperature and rest they require, no difficulty is found in the cultivation of the majority of *Dendrobiums*.

HOUSES FOR ORCHIDS

Although it is not necessary to build houses specially for Orchids, where gardening under glass to any extent is carried on for a large collection, it is better to devote houses exclusively to them, either by converting already existing structures or by building new. If old, the house should be thoroughly cleaned, and the arrangements for ventilation, staging, and other details be in accordance with the directions here given.

Span-roofed houses facing east and west are preferable, as they allow of the greatest amount of light reaching the plants; but if any other aspect is more suitable or convenient, that matter need not stand in the way. If it is intended to build a house of

one compartment, it is better to arrange and heat it as an intermediate house (fig. 167); but if the collection to be grown is of a general character, then three houses or divisions should be provided so that three sets of conditions will be available. For this purpose a span-roofed structure, from 60 to 100 feet in length, with two glass partitions dividing it into three compartments, will be suitable. The width may be from 10 to 18 feet, and the height to the top of the span 8 to 10 feet. The brickwork of the house should be carried up to the level of the stage, and above that the sides should be of fixed glass, not movable to act as ventilators, as air admitted on a level with the plants is not good for Orchids.

Ventilation.—Provision for this should be by openings in the brickwork just above the ground-line, so that the air enters beneath the stages. These openings should

egress of bad air, for it should be remembered that even the laps of the glass supply some top ventilation. The openings should be fitted with sliding traps or covers, so that

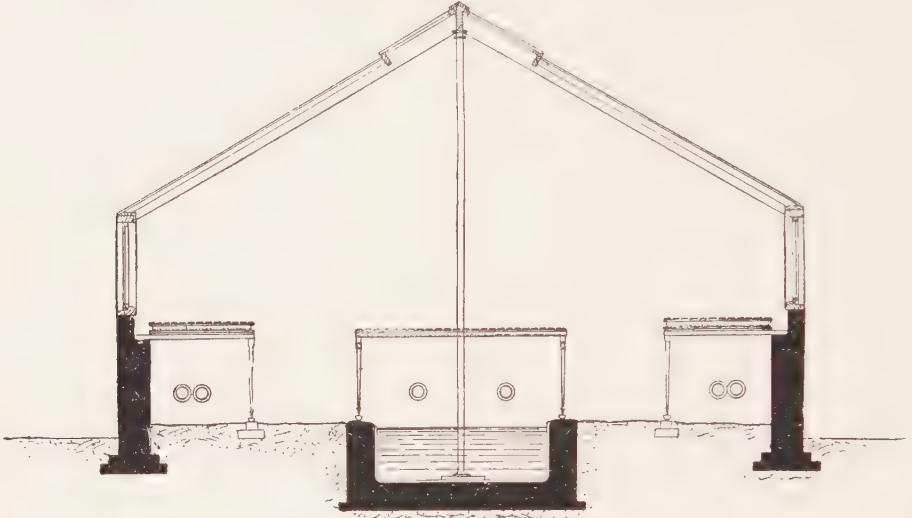


Fig. 167.—Intermediate Orchid House

be about 18 inches in length and 6 or 9 inches in width, and occur about 9 feet apart on both sides of the house. These should be the principal means of ventilation, top ventilators being used only to allow of the

the admission of air may be easily regulated. The top ventilators should be placed at whatever may be thought the most suitable position. Usually small sashes are provided, which can be opened to the desired extent

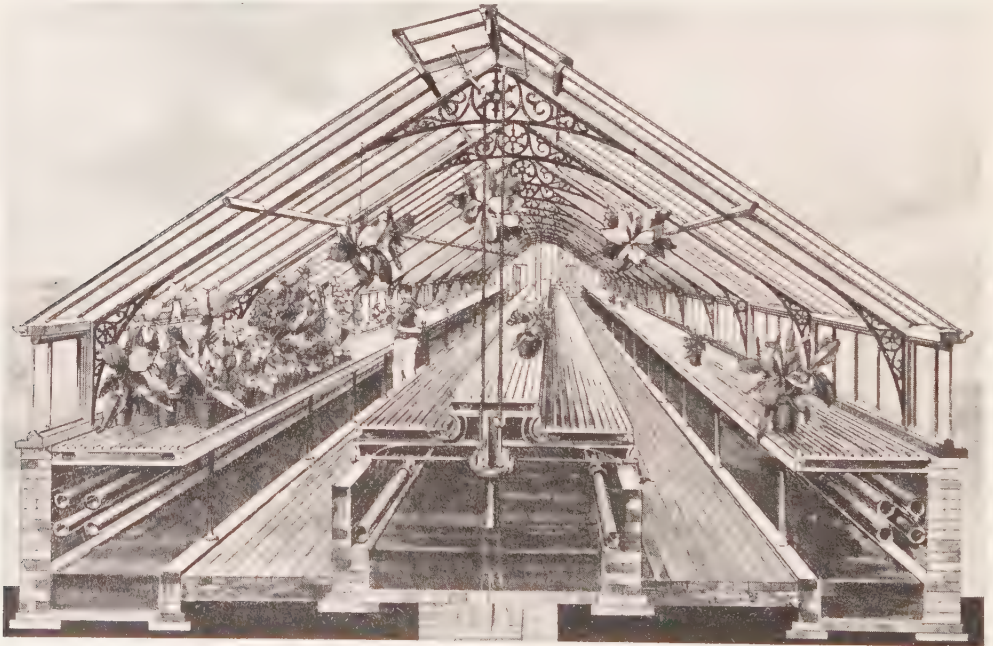


Fig. 168.—Interior of Orchid House (Boulton & Paul, Ltd.)

either by cords or by some mechanical arrangement. Beyond these it is well to provide a small ventilator at each end of the roof at the highest point.

The inside of the roof should have stout wires stretched from end to end at intervals, to provide for suspending the plants grown in baskets and pans. This provision should also be made over the sides of the walks and other places where plants may be suspended, to prevent the water from dripping from them on to the plants beneath. Should the suspended plants be numerous and directly over the stages occupied by other plants, they should be taken down to be watered, and allowed to drain before being returned.

Drip.—Whether it be from plants overhead or from the roof of the house, constant drip is injurious to Orchids; therefore it is advisable when constructing the house to prevent condensed moisture from dripping on the plants by having the sash-bars grooved, or by fastening to the under sides strips of zinc to conduct the moisture to the bottom.

Heating.—For a single structure to be used as an intermediate house, three rows of 4-inch piping extending round the house will be ample. If three houses or divisions are provided, they should be arranged as East Indian or warm house, Brazilian or intermediate house, and cool or *Odontoglossum* house respectively. The division next the boiler should be warmest; and, as it is in all cases best to have a good command of heat, it should have four rows of 4-inch piping on each side. The intermediate division will require three rows, and the cool one two rows. Stop-valves should be fixed in the pipes to control the heat in each division. Pipes to supply bottom-heat, or for heating water-tanks, are not required. The hot-water boiler should be so fixed that there is no possibility of sulphurous fumes passing from the furnace or chimney into the house; it should never be set in a stove-hole under the house, but outside and clear of it.

Cool Orchid House (fig. 169).—Some amateurs elect to grow cool-house Orchids only, and for their model they may take the cool-house span-roofed section of the range in three divisions previously alluded to, with a width of 10 or 12 feet, and 8 or 9 feet in height, the path down the middle of the house, and the staging on either hand. Or it may be built as a lean-to or three-quarter span facing north, north-east, or

north-west, cool Orchids succeeding best when they escape the full effect of the solar rays in summer. If convenient, the walk may be sunk a couple of feet below the surface of the ground, to assist in keeping the house moist and cool in summer.

For glazing Orchid houses the best 21-oz. English glass, in pieces 9 inches wide and 12 to 18 inches long, is best; but of course the glass must be cut to fit the woodwork of the house; if the panes are of moderate size, the cost of replacing them, if broken by frost or otherwise, is not great. For new houses it is best to have the roof as light as possible, consistent with stability.

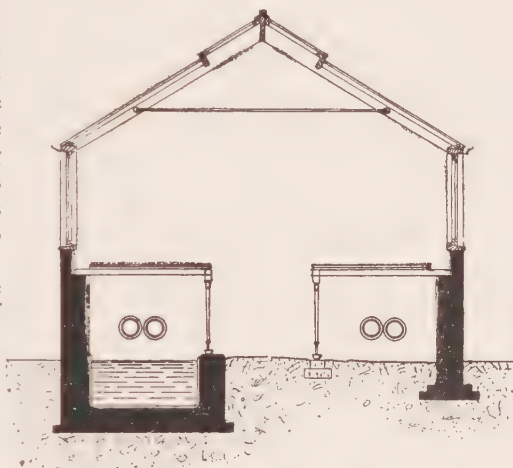


Fig. 169.—Cool Orchid House

Stages and Floors.—If the span-roofed range recommended is to be built to the widest measurement given, a stage should extend along both sides with a table-like stage in the middle (see fig. 167). If a house is built for *Odontoglossums*, &c., on the lesser scale, a stage on either hand with the walk through the middle are most convenient. Orchids like to be raised above a stage covered with shingle, small coal, ballast, or any other moisture-holding material, the plants being the more easily supplied with moisture and a free circulation of air. Inverted flower-pots are often used for this purpose. A proper and convenient stage for Orchids may be described as follows:—The upright supports and the frame on which the stage proper is placed should be of light iron, ordinary angle-iron being by far the best. The front and back supports should also be of angle-iron placed so as to form a rim to hold the shingle or other substance to be placed thereon. The

back support should be at least an inch from the side of the house in order to allow warmth and air to circulate. Light iron bars running from front to back should be placed to support the slates or tiles to form the stage. Ordinary flat red roofing-tiles a foot square do excellently well. Over these a layer of shingle, ballast, or coke-

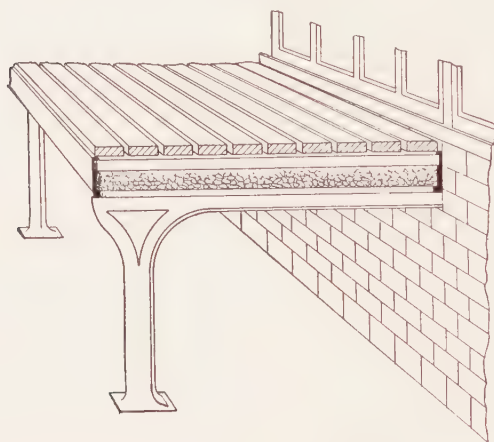


Fig. 170.—Slate and Iron Stages, with Movable Battens on Top, suitable for Orchid Houses

breeze is placed. This forms the lower staging, which is to be kept constantly wet. Above this an open or lattice wooden stage should be fixed (see fig. 170). An excellent and convenient open staging to be removed or placed as required can be made of battens by any handy man, and if made in lengths of about 12 feet it will be found especially useful. The lattice stage should stand on single bricks above the permanent stage. The bricks and the whole of this upper staging can be conveniently removed during cleaning or other operations, and returned as required. This is the cheapest, cleanest, and most convenient kind of open staging, and it can be whitewashed every year with little trouble and the harmful effect of painted staging avoided. The double staging has this advantage also: the lower close stage prevents the hot dry heat from the pipes from ascending directly to the plants, and also provides a sure and regular supply of moisture by evaporation.

Some cultivators construct their Orchid houses as follows:—The ground space except the path is converted into tanks, which serve as reservoirs for rain-water, and also afford the requisite atmospheric moisture through evaporation. The open or lattice stages are

fixed over the tanks, which, of course, are all open, so that the water that runs from the plants drops back into the tank. For cool Orchids this is an excellent arrangement. It is, however, costly, the tanks, if properly made, being an expensive item. If an old plant-house is to be turned into an Orchid house, clear out the inside, take up the flooring if of cement or other hard substance, so that there be only an earth floor; provide wooden trellises for the walks; see that the arrangements for ventilation, heating, shading, and other matters are suitable, and fit with an open woodwork ordinary plant stage, fixed to bring the plants well up to the glass, and a cheap and good Orchid house is provided. But the ascent of the heat from the pipes direct to the plants, especially in cold weather, must be prevented by placing a row of slates over the staging where the heat is likely to do harm, and unlimited moisture must be forthcoming from the floor, especially in warm weather. Nothing is better or healthier in an Orchid house than the natural earth as a floor, which, for cleanliness and neatness, may be covered with shingle or cinders. An oak or pitch-pine trellis (fig. 171) may be placed along the middle of the path in houses where a wet walk would be objectionable. Paths of Portland cement, tiles, or flag-stones are not favourable to good cultivation.

Water Supply.—Rain-water only should be used for Orchids. Sufficient tankage should therefore be provided in the basement of each house to catch all the rain-water possible. In former times it was considered necessary to warm the water by running

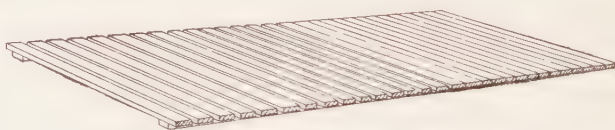


Fig. 171.—Wood Batten Foot-path for Orchid Houses

hot-water pipes through the tanks. Such an arrangement, however, is often fraught with danger, especially in winter, from the excessive moisture raised. Water which has been stored in an unheated tank for some hours in the house in which it is to be used is warm enough for even the most tropical species. When in summer the supply of rain-water is in danger of running out, water from a pond or rivulet which is not "hard" should be brought into the house and mixed with that in the tanks for use until rain comes. Some allege that the

rain-water of towns cannot be good, by reason of the sooty deposits on the glass and other surfaces on which it fell; but this very soon settles in the tanks, and the water is if anything the better for it. The tanks should be cleaned out annually.

Shading.—The necessity of sunlight for Orchids generally will be understood if we bear in mind that many of them when wild are in close proximity to the equator, where on clear days the sun shines perpendicularly over them, or at a very slight angle, while under cultivation the sunlight comes to them at a much greater angle, so that we are not able to give them much more than one-half as much light here, taking the year round, as they would get at home. But the difference between the conditions in the open air and under glass is considerable. In every case a bright, clear light, toned to prevent sunburn, is essential to the healthy growth and flowering of most of these plants.

Plants which grow at a high altitude “in the full blaze of the sun” require to be carefully shielded from bright sunshine in glass houses here. A plant growing wild in its native home and in the free air is very differently situated from one cultivated under glass, and, unfortunately, in many cases under glass of inferior quality. It should therefore be understood that every house set apart for Orchid culture will require to be shaded for a portion of the year. Some cultivators use a stipple laid on the glass with a brush, or even syringed on, but it is not a good plan, as it is there in dull weather, when all the light possible is an advantage. It is also apt to be washed off in rainy weather, and when bright sunlight follows, the plants are in danger of being scorched worse than if no shading had been used. Such shading can be used for the ends and parts of the roof of the house where the canvas shading does not meet. The roof-shading should be of canvas blinds on rollers. The *Odontoglossum* or cool house, and the East Indian house, require thicker blinds than the *Cattleya* or intermediate house, whilst the Mexican *Lælias*, *Barkerias*, *Dendrobiums*, &c., only require the very lightest and gauze-like

shade. Wood-lath blinds (fig. 172) are the very best form of shading for Orchids, as they admit direct sunlight in such a way as to benefit the plants without scorching them. The blinds should run on supports 4 to 6 inches above the glass, to admit of a current of air under them. The blinds should be down only when required to protect the plants from the sun’s rays, and drawn up during spells of dull weather. The sole object of shading is to protect the plants from



Fig. 172.—Lath Blinds for Orchid Houses

excessive sunshine, but to exclude as little diffused light as possible.

NEWLY IMPORTED ORCHIDS

In forming a collection of Orchids, newly-imported plants, or those which have been what is called “semi-established”, are as a rule the best. Preference should be given to the fresh arrivals, which almost invariably start into growth more vigorously than plants which have already undergone a course of artificial treatment, and which often suffer through being passed from one system of management to another. Spring is the best time to get imported Orchids, but any other season need not be objected to, provided the plants are in the proper condition on arrival. Generally the plants are then at rest, and more or less emaciated by their long journey. They therefore require a course of treatment that will make them plump again. It is, however, useless to supply them with compost until they start into active growth and develop new roots. Orchids with pseudo-bulbs, such as *Odontoglossums*, should be carefully looked over on their arrival, removing all dead por-

tions, or any insect pests which may come over with them. Each plant should then be placed in a small pot filled with clean crocks so arranged as to hold the plant steady, using a stake also if necessary, and placed in a cool or temperate house of that degree of humidity which will ensure the plant's being supplied with sweet, moist air. After three days the crocks which support the plants in the pots may be watered daily, as the moisture passes quickly away. In time the plants will commence to grow and root, and then, and not till



Fig. 173.—*Cypripedium bellatulum*

then, should they be finally potted. The length of time after arrival in this country before the plants start into growth differs according to the state in which they were collected abroad, &c. Species that require a long rest, and which were collected at the beginning of their resting season, are slow to start, whilst others may begin to grow vigorously at once. The condition of the growing-point or bud of the plant must also be considered; if injured or broken off during manipulation it will be slower to start into growth than if it had escaped injury.

Plants with no distinct pseudo-bulb, or with more or less woody stems and fleshy distichous leaves, such as *Phalænopsis*, *Vanda*, *Aerides*, *Saccolabium*, and *Cypripedium*, are more liable to injury through

importation. As soon, therefore, as they are unpacked they should be saturated by immersing them in clean rain-water for half an hour, afterwards suspending them singly, head downward, in a shaded house, taking them down and giving them a dip every morning until they are plump, when they should be crocked up in pots or baskets as recommended for pseudo-bulbous kinds. No matter how high a temperature an Orchid may require when established, it should, if freshly imported, be kept in a warm moist atmosphere until it is seen to be about to grow and root freely, when it should be potted and placed with the established plants of its kind.

TABLE OF TEMPERATURES

MONTHS.	Warm House (East Indian).		Intermediate House, Cattleyas, &c.		Cool House, Odontoglossums, &c.	
	Day Deg.	Night Deg.	Day Deg.	Night Deg.	Day Deg.	Night Deg.
January ..	65-70	60	60-65	55	50-55	45
February ..	65-70	60	60-65	55	50-55	45
March ..	65-70	60	60-65	55	55-60	50
April ..	65-70	60	60-65	55	55-60	50
May ..	70-75	65	65-70	60	60-65	55
June ..	75-80	70	70-75	65	60-65	55
July ..	75-85	70	70-80	65	60-70	55
August ..	75-85	70	70-80	65	60-70	55
September ..	75-80	70	70-75	65	60-65	55
October ..	70-75	65	65-70	60	60-65	55
November ..	65-70	60	60-65	55	55-60	50
December ..	65-70	60	60-65	55	50-55	45

The day temperatures to be maintained by sun-heat when possible. The night temperatures are the minimum.

TEMPERATURE AND VENTILATION

Temperatures.—Orchids grown under comparatively cool treatment are as a rule the healthiest. A temperature much lower at night than in the day is of vital importance. A thermometer should be in every house, and the required temperatures indicated on a tablet attached. Care should be taken that the temperature at night does not fall below that prescribed, especially in the case of the lowest temperatures; the running up of the temperature in the daytime by sun-heat on hot days, even much beyond that here recommended, need not cause anxiety if the house is properly damped down, ventilated, and shaded. Extra heat, if caused by the sun, is as a rule more beneficial than otherwise. Fire-heat, on the contrary, is a necessary evil, and, if the temperatures indicated could be maintained without its use, the plants would be all the healthier, excess of artificial heat being too often the cause of the bad health, or even

the death, of large numbers of Orchids.

Humidity of atmosphere is secured by liberally and frequently sprinkling water on the floors and under the stages, and by syringing the walls. It used to be the custom to have evaporating troughs on the hot-water pipes, and to raise steam by syringing the hot pipes, but the practice has been wisely discontinued as it may injure the plants, and sufficient moisture can be easily provided without it.

Ventilation.—Whatever the temperature of the air, it should be pure, and to ensure this, a careful use of the ventilators is requisite. They should be just above the ground-line for the lower openings by which air is admitted, and at the highest point in the roof for the egress of the vitiated air. At the same time care must be taken that the openings of the ventilators are carefully balanced so as not to cause currents of air likely to be injurious. For this reason it is better to open all the ventilators an inch or so than to open two or three of them wide and allow the rest to remain closed. Bottom air may be conveyed to each house by means of large drain-pipes leading from outside.

The ventilators are important as a means of regulating the temperature of the house. Care, however, should be taken not to put on too much air, especially by opening the top ventilators. A draughty house, though cool, may cause more injury than a close house. Except during very severe weather, when the fires have to be driven, the bottom ventilators should be left open all night and all the year round. It is a wise plan to cover the insides of the traps of the bottom ventilators with fine wire-netting, to keep out cats, rats, &c.

A moist atmosphere is very essential to the health of Orchids, and the distribution of water on and under the stages and on the floors assists in supplying the requisite temperature and humidity. In spring, summer, and early autumn, too much moisture cannot easily be provided, but in winter a drier air is required. At all seasons the supply of moisture should be regulated by the weather outside. In bright sunny weather much more water should be distributed about the houses than in dull weather. In very hot weather it is a good plan to thoroughly damp down the house at midday, and at the same time throw open every door for five or ten minutes, which ensures a thorough change of air about the plants.

POTTING

Potting Materials.—There is nothing to equal good *Osmunda* fibre, or bracken-peat and living sphagnum moss for all epiphytal Orchids. Where these are to be had nothing else is needed. The fibre of *Polypodium vulgare* is also used, and is perhaps the next best thing to the bracken-peat fibre; when mixed with *Osmunda* fibre and sphagnum moss it is good potting material. Unfortunately a good light, thick sample of the right sort of bracken-peat is difficult to obtain; and consequently the *Osmunda* and *Polypodium* fibres cannot be done without.

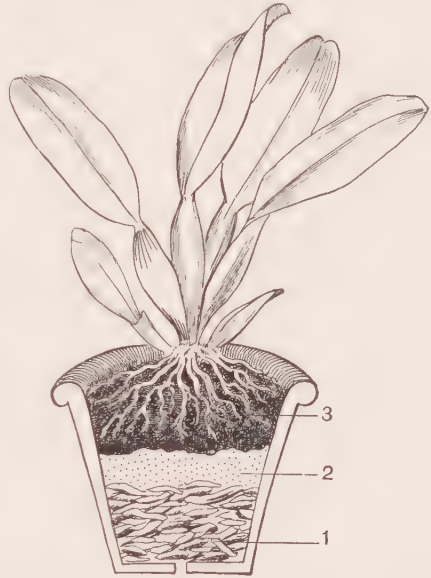


Fig. 174.—Section through potted *Cattleya*, showing: 1, crocks; 2, sphagnum or coarse fibre; 3, compost.

It should be broken up by hand, and on no account beaten to pieces with spade or chopper. The stout bracken rhizomes should be set on one side to be placed over the crocks in the larger pots, as it is excellent material for the roots to run amongst, and lasts for years. Many Orchid growers now sterilize the fibres used for the plants as a precaution against eelworm and other noxious pests. The sphagnum should be picked over to remove bits of wood and other debris, and if not wanted for immediate use it will keep alive for a considerable time if simply covered with mats and allowed to take the weather under a north wall outside, or in a cold open shed; in no case should it be allowed to get dry, or it will die.

Potting Epiphytal Orchids.—Experts have

no set time for potting or basketing Orchids. There are, however, two main seasons in which the whole of the plants should be gone through, and those which require it shifted into new pots or baskets, but in no case should a plant be repotted unless more root space or fresh compost is needed.



Fig. 175.—*Dendrobium* growing in a Basket

September and February are favourable times for a general overhauling of the collection. *Cattleyas* and *Laelias*, such of them as require it, may be shifted at any time in the summer, good fibry peat and *Osmunda* fibre and crocks only being used. The Brazilian species should be kept rather dry after repotting until they are seen to be starting new growths; thus treated they root better if kept in a moist atmosphere after

potting. The end of September is a good time for overhauling *Odontoglossums*, *Masdevallias*, and other cool-house plants. Pots half-filled with crocks should be used, and for potting material equal parts of *Osmunda* fibre, fibrous peat, and sphagnum, without admixture of sand or anything else. The contents of the warm or East Indian house, *Aerides*, *Saccolabiums*, *Vandas*, &c., should be examined at the end of February, or early in March; those that require to be repotted should have their pots filled two-thirds with clean crocks, the older roots to be placed among the crocks. The potting material should be living sphagnum only.

All the plants in the warm house, and any of the other epiphytal sorts in the intermediate house, may be grown in baskets (fig. 175), and in the case of East Indian Orchids it is doubtful whether this is not the best way to grow them, for their roots require almost as much air as their leaves, and it is not so easy to get air to them in pots as when they are in baskets. Equally good specimens have, however, been grown in pots as in baskets, so that it becomes more a matter of choice than necessity. Small plants which enjoy a position near the roof-glass are best in baskets or pans.

An Orchid should never be repotted until it really requires it, and then, no matter what the season may be, the operation should be performed. Large pots should be avoided, pots relatively small for the size of the plants being suitable, overpotting being a source of much mischief. A good time to repot any Orchid is when it has flowered and is seen to be sending forth new growth, and to be making fresh roots. Those species which flower with the young growth should be repotted after the flowers are over.

Potting Terrestrial Orchids.—By “terrestrial” is meant those species which grow on the ground, and by “epiphytal” those which grow on trees. These terms, although somewhat arbitrary, have for gardeners a useful significance, for they indicate whether the plant obtains its food chiefly from the soil (terrestrial) or from the atmosphere (epiphytal), these latter requiring good holding open material in which to grow. Potting material for terrestrial Orchids is of various combinations. For *Calanthe*, *Phaius*, and most of the strong-growing kinds many use with success three-fourths good turfy yellow loam broken up by hand, and one-fourth Orchid peat and silver sand, the pots used being crocked one-third the way

up. Where really good loam can be got this is excellent. A useful mixture for most terrestrial Orchids consists of one-third turfy yellow loam broken by hand, one-third brown peat, and one-third sphagnum moss and silver sand. Or a useful and economical mixture may be made of one-half turfy yellow loam, and the other half composed of the best of the old stuff taken from the epiphytal Orchids when they were repotted, with a little sand added. Some cultivators use dried cow-manure in the soil for such plants, but it is better to rely on the application of a little weak liquid manure at the proper time. For some of the stronger species a slight sprinkling of $\frac{1}{2}$ -inch or $\frac{1}{4}$ -inch bones, or a thin layer of the same placed over the crocks is good, especially for *Cypripediums*. Terrestrial Orchids should not be raised much above the rim of the pot, as for the epiphytal species.

The time for repotting terrestrial ever-green Orchids is soon after the flowering is over. These require to be kept moist all the year. Terrestrial Orchids which lose their leaves, and therefore require a dry period of rest in a cooler temperature, viz. *Thunias*, and some *Calanthes* require a strong heat when growing. They all start in February or soon after, and when the new growths are seen to be an inch or so in length, they should be repotted, placing the largest bulbs singly in 5-inch pots, and the smaller ones several together. They should then be placed on a stage or shelf near the roof-glass, and kept tolerably dry until the roots are seen to be taking hold of the soil, when they may be watered liberally and regularly until the growths are fully made up. During active growth a little very weak liquid cow-manure may be given them. When the leaves begin to turn yellow, water should be given sparingly, and on the flower-scapes appearing only sufficient water should be given to keep them going. After flowering, the plants should be stored on a dry shelf in a temperature not less than 55° F., and be kept without water until potting time.

Cypripediums may with safety be repotted whenever they require it, after they have flowered being perhaps the most convenient time. *Disa grandiflora*, *D. racemosa*, *D. tripetaloides*, and the various hybrids should be repotted in October and kept in a cool house. They require water all the year round, but especially heavy waterings from February until their flowers are over.

HARDY ORCHIDS

Hardy Orchids such as the North American *Cypripedium spectabile*, *C. acaule*, *C. pubescens*, *C. parviflorum*, &c., and the European species of *Orchis*, *Ophrys*, &c. grow usually in moist woodland or boggy situations in decayed moss or other decomposed vegetable material, and, although they



Fig. 176.—*Cypripedium Fairieanum*

experience cold in winter, they are protected by fallen leaves and snow. These facts should indicate the treatment most suitable for them under cultivation. They do best on the shady side of a rootery or rockery, in moist situations, in the material recommended for terrestrial Orchids, to which about one-third its bulk of well-decayed leaf-soil has been added. In spring and summer they require plenty of water; but after flowering, as a rule, no water need be given, the rains supplying sufficient. Those who prefer to grow them in an unheated pit or frame will find them do best in well-drained pots or pans, and kept copiously

watered. On the approach of hard frosts in winter some dry leaves or other material should be placed over the crowns, and the frame kept closed until spring.

The South African *Habenarias*, deciduous *Disas*, *Satyrums*, and others may be grown successfully in an unheated frame in full sun. During winter they should be covered with 6 inches or so of dry leaves, to be removed in March, when the tubers should be repotted and watered. They flower in summer, and after flowering require no water.

SUPPLYING WATER TO ORCHIDS

Syringing.—The use of the syringe in the Orchid house, so far as the plants are concerned, is mischievous unless limited to the walls and about the stages. It may be used for *Dendrobiums* when in full growth and in a very high temperature, but even for these it is not necessary, a more regular supply of moisture, more beneficial to the plants too, being kept up by liberal watering at the root, and by frequently damping down.

All Orchids when actively growing require a liberal supply of water at the root if the drainage is perfect, so that the water does not stay to sodden the material about the roots, even the most moisture-loving of Orchids being injured by this condition. Tropical Orchids require moist heat when they are growing, and even cool Orchids are not easily injured by it at that season. Hence it is that some growers, who prefer high temperatures, get their plants to thrive marvellously for a time; but when the resting season comes, unless the temperature is fitted to the season of repose, ill-health often results.

The season of growth for Orchids varies, and in a large collection there are always plants in full growth. Each plant gives unmistakable signs of awakening activity to the observant grower, and again shows by its behaviour when it would benefit by a rest. Growth having fully matured, flowering taken place, and a more or less lengthy period of rest having been provided for, the new leaves which the plants make will be known to be new growth, and an infallible indication that the growing season has arrived, when moisture and increased heat should be given. Any advance which the plant may be induced to make before its time will result in a loss of vigour, growth being most vigorous after a full rest.

Our spring is, as a rule, the beginning of

the growing season of tropical Orchids, and our winters being long and dull, it should be the object of the grower to use all the means in his power to induce as many of the plants as possible to finish growth early in the autumn while there is yet sufficient sunlight to thoroughly ripen them.

Resting.—Orchids may conveniently be divided into three classes, viz. the deciduous epiphytal, the evergreen epiphytal, and the terrestrial. Of the deciduous epiphytal we have examples in *Dendrobium nobile*, *Thunias*, *Calanthes*, all those in fact whose leaves turn yellow and fall soon after the pseudo-bulbs are matured. These should be rested in a perfectly dry house in a light position, and in a temperature of 50° to 60°, unless the excess is by sun-heat, and be kept dry until flower-buds appear, when a little water may be given. A vinery or other fruit-house at rest is suitable for resting Orchids. Should such a house not be available, and the pseudo-bulbs shrivel through excessive drought, a little water ought to be given, say once a week or so, in order to keep the old bulbs tolerably plump. *Catasetums*, *Mormodes*, *Cynoches*, *Galeandras*, *Cœlogynes* of the *Pleione* section, and all Orchids which by the dying and falling of the leaves show that they require a protracted dry and cool rest, should be treated in this way.

A large number of *Dendrobiums*, such as *D. thyrsiflorum* and *D. Farmeri*, *Cattleyas*, *Lælias*, *Oncidiums*, &c., are of an evergreen, or partly evergreen, character, losing some leaves every year, but not those of the preceding year's growth. These may be rested by a more free admission of air and partial withholding of water. *Aerides*, *Saccolabiums*, *Vandas*, *Phalænopsis*, and all the species with woody stems and distichous leaves, require a rest after the last made leaf is as long as the others, and no more leaves are proceeding from the centre, an indication that rest is required.

Evergreen terrestrial species, after having matured their growth and flowered, only require sufficient moisture to support the already formed tissues until growth again begins. The importance of recognizing the proportionate seasons of growth and rest for Orchids under cultivation is not far to seek. Under natural conditions the seasons and rains regulate their periods of growth, maturity, flowering, and resting, although in many instances in a manner quite different from that given to them when under cultivation. For example, many of the Indian *Dendrobes*, whilst at rest, are so dried up

by the heat that they are scarcely recognizable as plants at all, and would undoubtedly perish but for the cooler nights. The hot dry season, when growth is impossible, holds the plant in check until the cooler, moist, growing season arrives, followed by a temperate period, when the flowers expand, and thus the year is made up. Were we to subject these plants to the heat and other

at that season it is also well to look over them again in the evening. In winter and in cold weather it is better to wait until about nine o'clock in the morning before watering. At that season, of course, comparatively little water will be needed. The condition of the growth of the plant should be the test as to the quantity of water given. Where growing and resting plants are kept in the



Fig. 177.—*Dendrobium nobile*

conditions they get in their own country, they would soon die. We see, however, that a period of inactivity is a necessary factor in the life of the plant, and as this can be given just as well with a low temperature and drought, the end is the same. Success in every operation connected with Orchid culture depends on a proper observance of the seasons.

Orchids in growth should be looked over every morning, and those which require it watered liberally, using rain-water where possible. In the heat of summer, the first thing in the morning is the best time, and

same house, it is safer to place each class together. If a plant is really actively growing, it requires a thorough soaking, and then to be allowed to remain, even if it be a day or two, until it is, although still moist, beginning to get dry again, when thorough watering should be repeated. If at rest, the plant either wants no water, or but little at intervals of two or three days. Home-raised seedling Orchids should not be rested until after their first flowering.

Care must be taken not to dry off small species completely during the resting season, or they may perish. Water must

be given occasionally to prevent shrivelling.

Orchids in baskets or pans suspended near the roof-glass generally grow satis-



Fig. 178.—*Denrobium linguiforme*, showing basket treatment

factorily (fig. 178). Baskets made of wire and various woods have been used, but none have proved so good as those of teak-wood, which can now be purchased at a far less cost than it would take to make them.

They are supplied with copper-wire suspenders, which are by far the best, as of all kinds of wire copper is the least harmful. Galvanized iron-wire is not so good.

The arrangement of the plants in the house is a matter of some importance. It should be borne in mind that the smaller and more delicate in construction the Orchids are, the nearer the roof-glass should they be. Whilst it may not be possible to suspend all such plants, some of them may be elevated on a special stage raised above the rest. Generally the plants should be one foot from the roof-glass; if nearer, there is a risk of damage during severe frost. A plant may do better in one position than another in the same house; this may be due to the effect of air-currents, shade, moisture, &c.; at any rate, it often pays to move plants to another position in the same house if they do not look happy.

PROPAGATION

In most cases Orchids are propagated by division. All those with pseudo-bulbs springing from rhizomes or woody con-

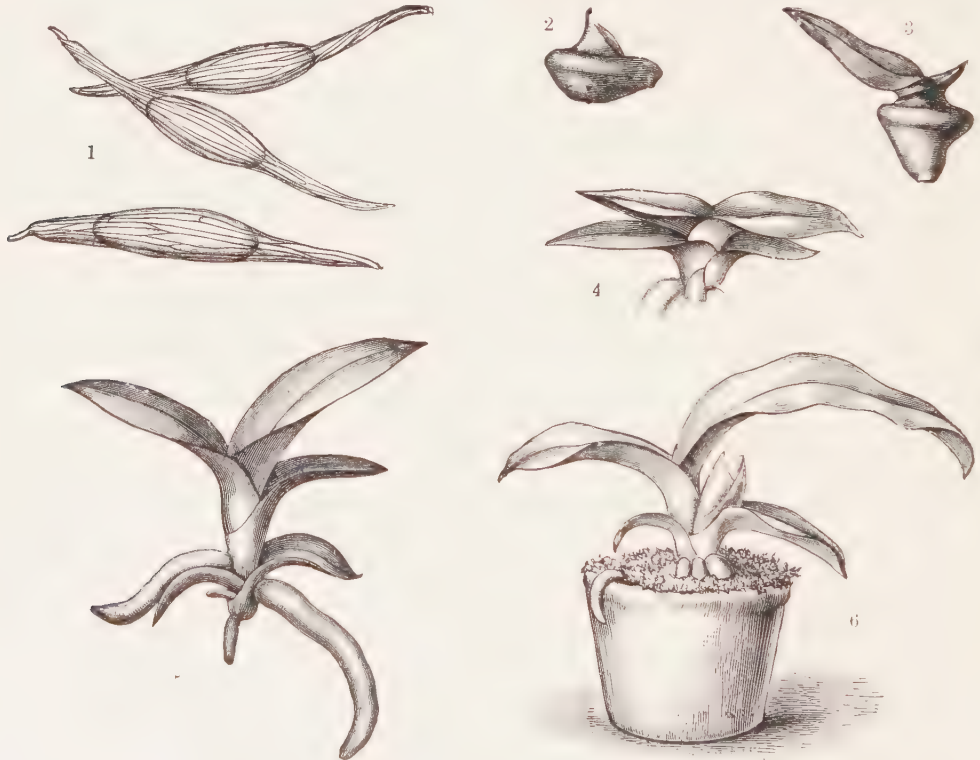


Fig. 179.—Development of *Cattleya*, from the seed to 2-year-old plant

1, Seeds; 2, seedling (6 months); 3, seedling (9 months); 4, seedling (12 months); 5, seedling (16 months); 6, seedling (2 years). 1 and 2, greatly enlarged; 3-6, natural size. (From Veitch's *Manual of Orchidaceous Plants*, by permission.)

necting stems, like *Cattleya* and *Lælia*, grow onward, the back bulbs having dormant eyes at the base. At the distance of two or three bulbs from the leading growth these rhizomes may at any time be cut half through, in order to induce what is termed a back break, and when such growth has

been obtained, the pieces may be removed to form new plants. Thunias, many *Dendrobiums*, *Epidendrums*, and others may be multiplied by cuttings of the ripened pseudo-bulbs, 3 or 4 inches in length, placed in pots in a warm growing house, and treated like cuttings of other plants.

BREEDING ORCHIDS

The raising of Orchids from seeds now receives much attention from growers, both amateur and professional, and many new and beautiful hybrids have been obtained. Orchids do not differ in this respect from other plants. Bi-generic hybrids—namely, *Sophrocattleya*, between *Sophranitis* and *Cattleya*; *Epiphranitis*, between *Epidendrum* and *Sophranitis*; *Epicattleya*, between *Epidendrum* and *Cattleya*; *Brasso-Cattleya*, between *Brassavola* and *Cattleya*; *Odontonia*, between *Odontoglossum* and *Miltonia*—have been produced. *Cypripediums* have been bred most successfully, as they ripen their seeds well, which germinate freely, and the plants flower in two or three years.

Although it is easy to get the seed-vessels to ripen, they do not always contain good seeds, and even when the seeds are good, it is often a difficult matter to get plants from them. It is the

practice to sow the seeds on the surface of the pots containing the parent plants, carefully recording the cross and date. Where hybridizing is to be carried on extensively, a case with movable glass covering in the warmest part of the house should be provided, and the seed-pots made up of specially-prepared very fine potting material placed in it on inverted pots. These should be thoroughly watered and allowed to stand a day or two before the seeds are sown. Wads of potting material covered with fine gauze or thin calico and placed in pots, are excellent for sowing the seeds on. After the seeds have been sown, water must be supplied with care, dipping instead of watering the pots, and allowing the water to soak upwards so that the seeds are not disturbed. The sprayer (fig. 180) is of great benefit for keeping up the necessary moisture about the seed-pots and



Fig. 180.—Hand Sprayer

small seedlings, and for general use in the Orchid house. The seedlings should appear in due course, and as soon as they are fit to handle they should be pricked off into store-pots. On attaining the size shown on 4 and 5 of the illustration (fig. 179) the little plants should be placed in thimble pots, and after that their progress is rapid. These operations require much care and patience, which may be rewarded with results of the greatest value or the reverse.

Potting material for seed-pots and for the earliest stages of the young plants must be fine, and to attain a uniform quality it must be rubbed through a fine sieve. Equal parts of *Osmunda* fibre, *Polypodium*, and sphagnum moss carefully blended through a fine sieve make a good potting mixture for small seedlings. Bracken peat may be used instead of *Polypodium*. For raising seedlings a small case like the ordinary propagating case, placed in a warm Melon or Cucumber house, is often a success, but wherever it is arranged a uniform warm moist atmosphere must be maintained.

PRUNING

Some Orchid-growers advocate the cutting away every year of all the old pseudo-bulbs of most *Dendrobiums*, the plants being then placed in a hot swampy house to make their growth. Pruning of a less drastic character, and which ought to be resorted to more than it is, consists in cutting away all small, old, worn-out pseudo-bulbs, which so often disfigure *Dendrobiums*, *Cattleyas*, *Lælias*, *Epidendrums*, &c., and which are not only useless and unsightly, but they interfere with the new growths, if not by depriving them of nourishment, at any rate by the obstruction of light and air.

All yellow or badly-spotted foliage should be removed from growing plants, on the principle that decay is often the result of disease. *Masdevallias* and such-like plants often bear twice as many leaves as they ought to, and the least sign of unsight-

liness on one ought to be the signal for its removal.

BASKET ORCHIDS

Some Orchids require to be grown in baskets, because their flower-spikes grow downwards, which in pots would be spoilt. *Stanhopea*, *Coryanthes*, *Acineta*, *Ludde-mannia*, *Gongora*, and *Cirrhaea* are genera with this habit. There are also many Orchids which display their flowers to

out stuff should be taken away and replaced with new. Where it can be used, the syringe is helpful, as with its aid all loose material is washed out, and the roots and basket more or less cleaned without any danger of bruising.

MANURE FOR ORCHIDS

On the whole it will be better for the Orchid-grower to steadily set his face



Fig. 181.—*Grammangis Ellisii*, showing basket cultivation

greatest advantage when grown in baskets suspended from the roof (fig. 181). Among these are *Cælogyne Massangeana*, *C. tomentosa*, *C. Dayana*, *C. Swaniana*, *Dendrobium Falconeri*, *D. Wardianum*, *D. crassinode*, *Saccolabiums* of the *Rhyncostylis* section, and indeed most of the Orchids which have long drooping racemose flower-spikes, and many others. The objection to baskets is that, after the plants have thriven for a time and rooted all over the wood, the baskets either rot or become too small, and have to be changed, the growth of the plant being thereby seriously checked.

Top-dressing is necessary for Orchids grown in baskets, when all movable worn-

against the use of manures in any form for epiphytal Orchids, and to carry it out on a very small scale, and in a very cautious manner, for the terrestrial species. Chemical manures must not be used. Weak liquid cow-manure may be given to *Calanthes*, *Phaius*, *Peristerias*, *Zygopetalums*, *Lycastes*, and other very strong-growing terrestrials, although some of the best plants ever seen in the country have been grown without its aid. A sprinkling of good guano under the stages in the evening occasionally, and especially in spring, or pouring weak liquid manure late in the day on the stages and under them, assists materially in giving health to foliage and in keeping down insect pests.

INSECTS

Orchids are liable to the attacks of aphides, especially in the spring, and of thrips, of which the minute yellow species

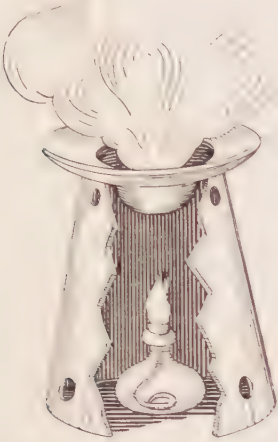


Fig. 182.—Richards' Patent Fumigator

is the worst, at all seasons. These are got rid of and kept down by dipping or washing or spraying with some insecticide, or by fumigation. Scale and bug of different kinds require careful removal by means of

brush—a soft tooth-brush is best—and sponge. Cockroaches should be kept down by placing beetle-poison about the houses, and by hunting for them at night. Woodlice must also be trapped. The Orchid-fly (*Isosoma Orchidearum*), which deposits its eggs in the young growths of Cattleyas, Lælias, &c., is also most destructive if it once gets established. In the course of time the grubs are hatched out, the young growths of the plants present a swollen appearance, and are injured beyond repair. Sometimes the roots are attacked in the same way by this or other of the insects, including borer-beetles, which have been imported with Orchids of late years. The only way to deal with them is to cut off and burn every affected young growth or root. The insect in its perfect form should be looked for morning and evening; it resembles a small, black, winged ant. By perseverance the pest is to be got rid of before much damage is done; the plants which have had their swollen growths cut off usually break well from other eyes.

Fumigation, when necessary, should be done lightly on three successive evenings, either with pure tobacco leaf or “XL All”



Fig. 183.—*Cattleya Trianae* “Hydra”, bearing 96 flowers

(fig. 182), which is safe, and usually destructive to thrips. Generally it is better to fumigate lightly once a week or so, to keep the insects from gaining a hold. The dipping-tub should be always on hand at potting time, so that all the operations necessary for each plant can be done at the same time. Most gardeners have a favourite dip for killing thrips; weak tobacco water and an infusion of Quassia chips are often effective, and are harmless to the plants even if the liquid runs down to the roots. A general insecticide for dipping, spraying, and sponging to keep down thrips, &c., is an emulsion of paraffin and soft soap, 1 oz. of each to a gallon of warm water. It must be used intelligently.

CUT FLOWERS

Orchid blooms are showy, and in some cases, when cut, they last an extraordinary time, often running into months if carefully tended; the plants are greatly benefited too by the removal of the spikes as soon as the flowers are fully matured. In some collections flower-holders containing water are kept in the Orchid house to receive the spikes of flowers which it is deemed advisable to remove, and which are not required for use in the dwelling-house or for sending away. In this way the plants are relieved, whilst the house is not denuded of the flowers. Shallow boxes should be used for sending the flowers a distance, layers of crumpled tissue-paper placed between the spikes holding them firmly without crushing them; cotton-wool should not be used, the crumpled tissue-paper being quite sufficient.

FOLIAGE PLANTS WITH ORCHIDS

The Orchid house is dull at certain times of the year unless a few other plants are employed for its embellishment. These may be grown on the edges of the close stages, and on simple rockeries, not interfering with the heating, beneath the staging. *Adiantum cuneatum*, *A. Capillus-Veneris*, and most of the other Maiden-Hairs, *Panicum*

variegatum, *Selaginella denticulata* and other species, *Begonia Rex*, *Sonerilas*, *Cyrtodeiras*, *Ficus repens* and *minima*, *Isolepis gracilis*, and such-like plants, are suitable for this purpose. Climbing plants of all kinds should be excluded.

SPOT OR DISEASE

Spot or Disease in Orchids is the result of defective cultivation, generally too high a temperature. It affects chiefly the evergreen, fleshy-leaved species, such as *Phalænopsis*, *Aerides*, *Vanda*, some *Oncidiums*, and even *Cattleyas* and *Cælogynes*. Apparently healthy plants suddenly develop dark-brown spots on the leaves, which in the course of time present dark dried-up patches of tissue. Plants thus affected are difficult to restore to health, but some good may be done by inducing them to make good rapid growth in the proper season, to be followed by a long rest in a cooler temperature afterwards. In some cases the disease is so virulent as to kill the plant outright.

A single Orchid house may be worked to perfection where there are other glass structures devoted to fruit or plant culture. The Orchid house itself should be heated and arranged as an intermediate house, the other houses being utilized for plants requiring special treatment. When the *Dendrobiums*, for instance, are seen to be about to grow, they should be placed in a Melon or Cucumber house. *Calanthes* will make very fine bulbs in the same quarters; indeed, any of the Orchids requiring a rapid growth in a hothouse should be so treated. When growth is completed, the plants should be replaced in the Orchid house. In the same way, when the deciduous *Dendrobiums*, *Thunias*, and other Orchids are losing their leaves and about to go to rest, they should be placed in a cool dry vinery, or greenhouse, where the temperature does not fall below 50°. Here they will be properly rested, and the Orchid house relieved of their presence at their shabbiest season. On the appearance of the flower-spikes they should be returned to the Orchid house.

COLLECTING ORCHIDS

In these days of travelling both for business and pleasure, an enthusiast may find himself in a country where Orchids are growing wild, or he may have friends abroad

who would willingly send to him living plants if they only knew how to set about it.

Newly collected Orchids need no preparation, and very little packing. The time to

collect them is when the last growth is fully matured and the new growth not started, in other words, when they are at rest. This condition is when the pseudo-bulbs are all of full size, and no young growth is proceeding from the base. *Aerides*, *Saccolabium*, *Phalænopsis*, and those which have no bulbs, when at rest have all the leaves full-grown and no young leaf proceeding

may be dispensed with if not to hand. A few light struts or sticks placed between the plants about the middle, and secured by nails through the sides of the box, help to keep the contents from rolling about or shaking too close together. *A few small auger holes should be in each box.* Large openings should be avoided, or rats may get into the box whilst on board ship. The

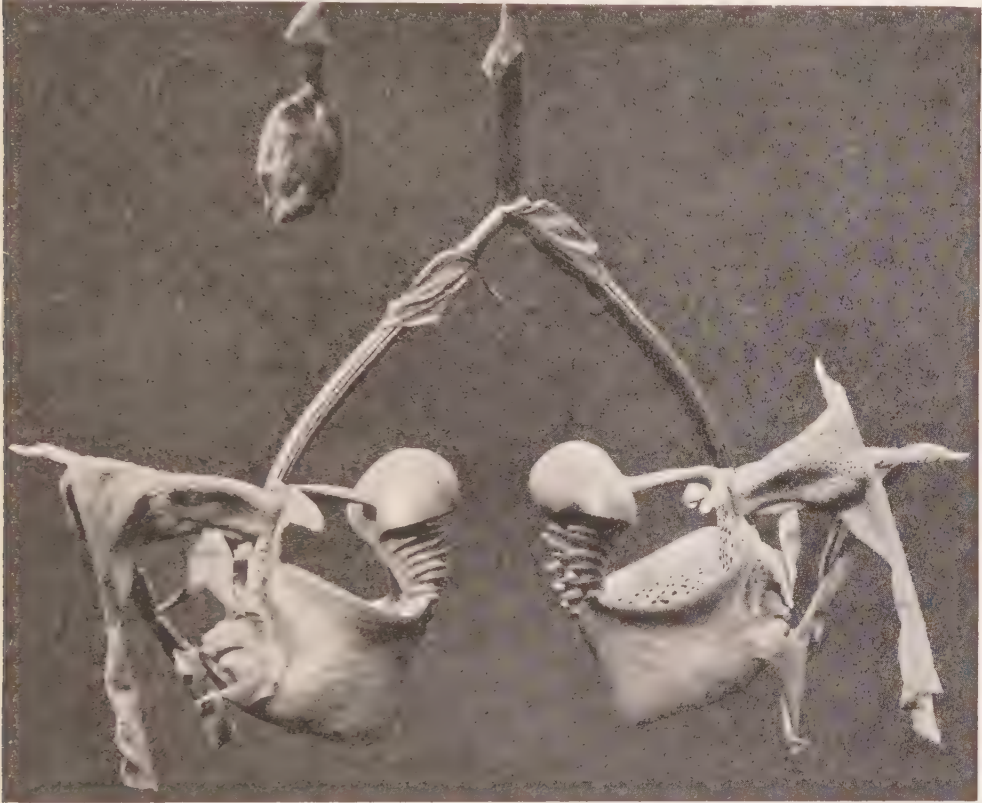


Fig. 184.—*Coryanthes macrantha* (The Bucket Orchid)

from the centre of the plant; the root-tips are also hard. If the packing-cases could be on the spot, and the plants laid in them at once and despatched, they would have the best chance of travelling well. The cases should be about 3 feet by 2 feet by 2 feet, into which a layer about an inch thick of dry moss or wood shavings may be put, then a layer of plants with their heads all one way, then another layer of moss or even of paper, followed by another layer of plants with their heads the reverse way, and so on until the case is full; the plants should be pressed in rather closely during packing. Moss or packing material of any other kind

boxes should be forwarded by the most rapid steamer, even if higher freights have to be paid; they should be labelled "Living plants, for cool dry place in hold".

The history of Orchid Hybridization is given in *The Orchid Stud Book* by Rolfe and Hurst, and in Sander's *List of Orchid Hybrids*. In 1847 Dean Herbert wrote: "Cross-breeding among Orchidaceous plants would perhaps lead to very startling results". Twelve years afterwards the first hybrid *Calanthe Veitchii* was exhibited, and during the next fifty years close on 2000 hybrids were recorded. They included about 800 *Cypripediums*, 600 *Cattleyas* and *Laelias*,

90 *Dendrobiums*, 90 *Odontoglossums* and 50 *Masdevallias*. The hybrid *Cypripediums* now (1921) number over 2000; *Cattleyas*, 1800; *Odontoglossums*, 1000. Hybrids between plants of separate genera are also produced, and in recent years these have received much attention from breeders, such crosses as *Odontoglossum* × *Cochlidia*, *Brassavola* × *Cattleya*, *Calanthe* × *Phaius*, and *Miltonia* × *Odontoglossum* having added greatly to the interest and decorative value of garden Orchids.

Orchid-raising is now an important department of horticulture. Experienced breeders are very successful in producing seedlings of superior quality and, not infrequently, of stronger constitution than either parent. Mongrelizing induces variation in colours and in form, often to an extraordinary degree, and there is no saying how great changes will be made in garden Orchids by crossing them and raising plants from seed.

SELECT LIST OF ORCHIDS

The following is a select list of the showiest species, varieties, and hybrids. The letters W., I., C., mean Warm, Intermediate, and Cool house respectively. The temperatures for each house for each month throughout the year will be found at p. 166. The

hybrids require the same treatment as their parents.

ACINETA.—Epiphytes, chiefly from Central America, requiring to be grown in baskets for the display of their heavy pendulous racemes of fleshy, yellow, yellow-and-red, or chocolate flowers. *A. Barkerii*, *A. densa*, and *A. Humboldtii* are the best-known species. I.

ADA.—A small genus allied to *Brassia*, inhabiting the Andes of Colombia at an altitude of 8500 feet.

A. aurantiaca.—Flowers in arching racemes, orange-scarlet. C.

A. Lehmannii.—Flowers orange-scarlet, lip white. C.

AERIDES.—Epiphytal, leaves distichous on stems; they may be grown either in pots or baskets, in crocks and sphagnum moss. The flowers, which are produced chiefly in summer and autumn, are wax-like in texture, and in colour white, blotched more or less with dark-rose or crimson.

A. crassifolium.—Leaves fleshy. Flowers among the largest of the genus. Burma. I.

A. crispum.—Flowers large, very fragrant. Nilgiri Hills and other Indian highlands. I.

A. cylindricum.—Leaves terete, flowers white, with yellow and crimson lip; very fragrant. Indian hills. I.

A. falcatum.—This includes *A. Larpentæ*, *A. expansum*, and *A. Leonie*. Flowers white and rose. Burma. I.

A. Fieldingii (Foxbrush). Flowers in long, dense, sometimes branched racemes. High lands in Sikkim and Assam. I.

A. Houletianum.—Yellowish-white and lilac. Cochinchina. I.

A. Laurencia.—The noblest of the *A. odoratum* section. Flowers large, white and crimson, very fragrant. Philippines. W.

A. maculosum.—Dwarf, with showy racemes of white and amethyst flowers. Western Ghats, India. I.

A. multiflorum.—Variable, similar in habit to *A. maculosum*, and of which the plants known as *A. affine*, *A. roseum*, *A. Lobbi*, and *A. Veitchii* are regarded as varieties. Sylhet, &c. I.

A. odoratum.—One of the oldest and best. Cochinchina and India. I.

A. quinque-vulnera.—A noble species,



Fig. 185.—*Angraecum Eichlerianum*

requiring more heat than *A. odoratum*. Philippines. W.
A. radicosum.—A compact plant from the Nilgiri Hills. Flowers ruby-red. Better known as *A. rubrum*. I.

A. Sanderianum.—A yellow-and-crimson *A. Lawrenciae*, and a very fine species. Philippines. W.

A. suavisimum.—Very pretty, varying so much in size and colour of flowers as to have led to its being repeatedly renamed. Varieties of it are known as *A. Reichenbachianum*, *A. Rohanianum*, *A. Ballantineanum*, *A. nobile*, and *A. flavidum*. Malacca. W.

A. Vandorum.—Leaves terete, flowers large, membranous, fragrant. Sikkim and Khasia Hills; altitude, 4000-5000 feet. I.

A. virens.—Resembles a slender *A. odoratum*. Java. W.

ANÆCTOCHILUS.—Dwarf terrestrial Orchids grown chiefly for their very beautiful foliage. They are difficult to manage and not easy to procure. They require a moist warm shady house, or may be grown under bell-glasses. India and Malay Archipelago. W.

ANGRÆCUM.—A curious genus inhabiting tropical and South Africa, Madagascar, and the Mascarene Islands, and bearing generally white fragrant flowers, with spurs often of extraordinary length.

A. articulatum.—Dwarf, producing long pendent racemes of cream-white flowers. Allied to *A. Ellisii*. Madagascar. W.

A. caudatum.—An extraordinary species from West Africa with large greenish flowers, with white lip and green spur 9 inches in length. W.

A. citratum.—Dwarf, bearing racemes of pretty French-white flowers. Madagascar. W.

A. eburneum.—A large grower, with stout spikes of large white flowers. Madagascar. W.

A. Eichlerianum (fig. 185).—Very free in growth and flowers, white. Tropical Africa.

A. Ellisii.—Flower-spikes pendent, 18 to 20 inches in length, flowers pure-white. Madagascar. W.

A. infundibulare.—White. Uganda. W.

A. Leonis.—A noble species with fleshy, falcate, vertical leaf-blades; the plant appearing as though compressed. Flowers large, white, fragrant. Comoro Islands. W.

A. modestum.—Resembles a small form of *A. Ellisii*. Madagascar. A very free-flowering form of this is known as *A. Sanderianum*. W.

A. Scottianum.—Leaves terete, like *Vanda teres*. Flowers large, pure-white. Comoro Islands. W.

A. sesquipedale.—The finest *Angræcum*. Flowers white, 5 to 6 inches diameter; spur 1 foot in length. Madagascar. W.

ANGULOEA.—A very handsome genus of the same habit as *Lycaste*, and bearing large flowers which in some degree resemble Tulips viewed externally. They are wax-like in substance and very fragrant. Chiefly summer-flowering.

A. Clowesii.—Flowers bright-yellow. Colombia. I.

A. Clowesii, var. *eburnea*. Flowers white. I.

A. Ruckeri.—Flowers green and brown externally; yellow densely spotted with red inside. Colombia. I.

A. Ruckeri, var. *sanguinea*.—Flowers yellow and dark-red. I.

A. uniflora (*virginalis*).—Flowers white. Colombia. I.

ARPOPHYLLUM.—A small genus from Mexico and Central America, with short reed-like pseudobulbs, and arching, fleshy, green leaves. The spikes proceed from the apex of the bulb, and the densely set rose-and-purple flowers are very attractive. *A. giganteum* and *A. spicatum* are the species usually seen in gardens. I.

BARKERIA.—A section of *Epidendrum*, requiring to be grown on blocks or in baskets suspended in full sunlight in an airy intermediate house, and liberally watered when growing. *B. elegans*, *B. Lindleyana*, *B. Skinneri*, and *B. spectabilis* are the best known. They are all Mexican.

BLETIA.—Terrestrial plants. The flowers are produced on erect spikes. *B. hyacinthina*, one of the best-known, thrives in a tolerably cool house; the purple *B. Shepherdii*, one of the handsomest, is intermediate.

BOLLEA.—A section of the genus *Zygopetalum*, with large and handsome flowers. The plants

are leafy like *Huntleya*, and require shade and moisture.

B. caelestis.—Flowers rich-blue. Colombia; altitude 6000 feet. I.

B. Lalindei.—Rose and white. Colombia. I.

B. Lawrenceana.—White, tipped with rose. Colombia. I.

B. Schrödertiana.—White with pink lip. Colombia. I.

BRASSAVOLA.—A genus of dwarf evergreen epiphytes, with white or greenish fragrant flowers. South America. The only large-flowered kinds are *B. Digbyana*, with large, white, fringed flowers and *B. glauca*. These two species have been crossed with *Cattleyas* × *Lælias* with surpris-



Fig. 186.—Brasso-Cattleya Veitchii, var. Queen Alexandra

ingly good results, the hybrids combining the characters of their parents so as to give flowers of great beauty and variety. Brasso-Cattleya Veitchii, var. Queen Alexandra (fig. 186), is one of the best; it has very large white flowers of good substance. All these hybrids require the same cultural conditions as *Cattleyas*. I.

BROUGHTONIA.—Pretty epiphytes from Jamaica and Cuba. They require to be grown on bare rafts without moss or peat, and in the full sun. Water freely in summer. *B. lilacina* and *B. sanguinea* are the two best.

BULBOPHYLLUM.—Interesting epiphytal Orchids widely distributed in India, Java, Borneo, Africa, and South America, the flowers varying from the tiny *B. micranthum* to the gigantic *B. grandiflorum*. One of the most remarkable is *B. Ericsonii* (fig. 187) which has a creeping rhizome, large leaves, and long spikes bearing heads of striking yellow and brown flowers.

CALANTHE.—This genus may be divided into

two distinct sections, viz. the evergreen or *C. veratrifolia* class, and the deciduous or *C. vestita* class. The latter require a long dry resting season, during which water should be withheld; the former should be kept moist all the year. The *C. vestita* group are grown largely in gardens, and many hybrids have been raised from them, which are among the best garden Orchids.

- C. curculigoides*.—Yellow. Java. W.
C. Masuca.—Purple. India. I.
C. Natalensis.—Purple. South Africa. I.
C. pleiochroma.—Rose. Japan. I.
C. rosea (*Limatodes*).—Rose-pink. Moulmein. I.

- C. Bowringiana*.—Allied to *C. Skinnerii*.—Flowers rose-purple. British Honduras. I.
C. citrina.—Pseudo-bulbs ovate, leaves glaucous. Flowers large, pendulous, yellow; grow on blocks of wood. Mexico. I.
C. Dowiana.—Flowers among the largest; buff-yellow, with yellow-veined dark-crimson lip; very fragrant. Costa Rica. I.
C. Dowiana, var. *aurea* (*C. aurea*).—Antioquia. I.
C. Eldorado.—Flowers pale-rose, with yellow and crimson lip. Brazil. I.
C. Eldorado, var. *Wallisii*.—White, with orange throat. I.
C. granulosa.—Stems reed-like. Sepals and petals greenish, spotted brown; lip crimson and white. Brazil. I.
C. guttata.—Flowers greenish, spotted brown; lip rose-purple. Brazil. I.
C. intermedia.—Flowers pale-pink, lip crimson. Brazil. I.



Fig. 187.—*Bulbophyllum Ericsonii*

- C. × Veitchii*.—Carmine-rose. The first hybrid obtained by crossing *C. vestita* and *C. rosea*. I.
C. veratrifolia.—White. India, Australia. I.
C. vestita.—White, with yellow eye. India. I.
C. vestita, var. *Regmerii*.—White, shaded purple. Cochinchina. I.
C. vestita, var. *rubra-oculata*.—White, with red eye. India. I.
C. vestita, var. *Turneri*.—White, with purple eye. India. I.

CATASETUM.—Very extraordinary Orchids, chiefly natives of South America, exhibiting a wide range of form and colour, and many interesting structural peculiarities. All are worthy of a place in gardens, *C. Bungeorothii* and a few others ranking among the showiest. I.

CATLEYA.—This genus shares with *Lælia*, *Dendrobium*, and *Odontoglossum*, the chief favour of lovers of showy Orchids. There are a great number of species, and also many garden hybrids.

C. Aclandiae.—Stems cylindric. Flowers 4 inches diameter. Sepals and petals yellowish, blotched chocolate; lip rose-purple. Brazil. I.

C. labiata.—The largest and showiest of the Cattleyas. Botanically it includes *C. Gaskelliana*, *C. Mossiae*, *C. Mendelii*, *C. Percivaliana*, *C. Schröderæ*, *C. Trianae* (fig. 183), and others, all of which are abundantly distinct for garden purposes, especially as they flower at different seasons. All have large rose-and-crimson flowers, and there are pure-white forms. The type, or autumn-flowering form, was introduced in 1818 from Brazil. I.

- C. Laurenceana*.—Flowers large, various shades of rose and crimson. British Guiana. I.
C. Loddigesii.—Stems slender, 1 foot; flowers rose. Brazil. I.
C. maxima.—Flowers large, rosy-lilac, with crimson-veined lip; often ten or twelve on a spike. Guayaquil. I.
C. Schilleriana.—Tall stems, with large spotted brown-and-purple flowers. Brazil. I.
C. Skinnerii.—Flowers in fine heads, bright rose. There is a white variety. Guatemala. I.
C. superba.—Short stems, with rose-purple flowers. British Guiana. W.
C. Walkeriana (*bulbosa*).—Brazil. I.
C. Warscewiczii.—Flowers often larger than *C. labiata*; rose and crimson. Also called *C. gigas*. Colombia. I.

The hybrid Cattleyas are now very numerous and most of them are easy to cultivate. A few of the best of them are:

Cymbidium



CYMBIDIUMS

C. Pauwelsii
C. Miranda

C. Butterfly

C. Warbler
C. Gottianum

Atalanta.—(*Leopoldii* × *Warszewiczii*).
Chamberlainiana.—(*Leopoldii* × *Dowiana aurea*).
Enid.—(*Warszewiczii* × *Mossiae*).
Fabia.—(*labiata* × *Dowiana aurea*).
Hardyana.—(*Warszewiczii* × *Dowiana aurea*).
Iris.—(*bicolor* × *Dowiana*).
Lord Rothschild.—(*Gaskelliana* × *Dowiana aurea*).
Mantini.—(*Bowringiana* × *Dowiana aurea*).
Maronii.—(*velutina* × *Dowiana aurea*).
O'Brieniana.—(*Loddigesii* × *Walkeriana*).
Octave Doin.—(*Mendeli* × *Dowiana aurea*).
Rhoda.—(*Iris* × *Hardyana*).
Tityus.—(*Enid* × *Octave Doin*).

CHYSIS.—Showy epiphytes with thick fusiform pseudo-bulbs and simple racemes of large wax-like flowers.

C. aurea.—Yellow, with crimson marks on lip. Venezuela. I.
C. bractescens.—White, with yellow streaks on lip. Mexico. I.
C. laevis.—Yellow, with red streaks on lip. Mexico. I.
C. Limminghei.—White, tipped with rose. Mexico. I.

CIRRHOPELALUM.—Allied to *Bulbophyllum*, with very quaint elegant flowers.

C. O'Brienianum.—Flowers in umbels, pale-yellow and crimson. I.
C. picturatum.—Flowers yellow and purple. Burma. I.
C. robustum.—A strong grower with large flowers. New Guinea. I.
C. Rothschildianum.—The handsomest of the genus. Flowers 6 inches long, dark-crimson. Darjeeling. I.
C. Thouarsii.—Yellowish, spotted rose or purple. Mascarene Islands. W.

COCHLIODA.—A small genus, some of the members of which have been included in *Mesospinidium*. *C. Noezliana* has orange flowers, and *C. vulcanica*, carmine. *Cochlioda* crossed with *Odonoglossum* gives *Odontioda*, the most beautiful of cool-house Orchids. With *Miltonia* it produced the hybrid called *Miltonioda*, and with *Oncidium*, *Oncidioda*.

CÆLOGYNE.—A noble genus inhabiting India, Malaya, and China, often at high elevations, and embracing many garden favourites. It has been divided into two distinct sections, viz. true *Cælogynes*, of which *C. cristata* is a good example, and *Pleiones*, which include *C. lagenaria*, *C. maculata*, *C. Wallichiana*, &c., frequently known as Indian Crocuses. They require abundance of water while growing, and a distinct dry resting season. The bulk of the true *Cælogynes* are evergreen.

C. asperata.—A very large white species. Malay Archipelago. W.
C. barbata.—White, with blackish lip. India. C.
C. corrugata.—Wrinkled bulbs, white and orange flowers. India. C.
C. cristata.—White, with yellow base to lip. The variety *alba* or *hololeuca* is all white. India. I.
C. Dayana.—Long drooping racemes of brownish flowers. Borneo. Grow in baskets. W.
C. Gardneriana.—Racemes pendulous; white, with yellow on lip. Khasia Hills. C.
C. Massangana.—A fine species for baskets, with cream and brown flowers. India. I.
C. Mooreana (fig. 188).—Erect racemes of shapely white flowers with dark eye. Annam. W.
C. ocellata.—White and orange flowers. India. C.
C. pandurata.—A noble species, with racemes of large emerald-green and black flowers. Borneo. W.

C. Sanderiana.—A grand species of the *C. cristata* class. Malaya. W.
C. Wallichiana.—This with *C. humilis*, *C. maculata*, and several others, form the *Pleione* section. All have lilac, rose, or white flowers, marked with yellow and crimson on the lip. Himalayas. C.

CORYANTHES.—A small genus with large flowers of extraordinary structure. *C. macrantha* (fig. 184) is known as the bucket Orchid, owing to the pitcher-like form of its labellum. Venezuela. W.

CYCNOCHES.—Singular plants requiring the same treatment as *Catasetum* and *Mormodes*, viz. abundance of water while growing, and a cool dry rest after. The best-known species are *C. chlorochilon* (the Swan Orchid), cream-



Fig. 188.—*Cælogyne Mooreana*

yellow, *C. Loddigesii*, and *C. Peruviana*. All are remarkable for the wide difference between their male and female flowers. Chiefly from South and Central America. I.

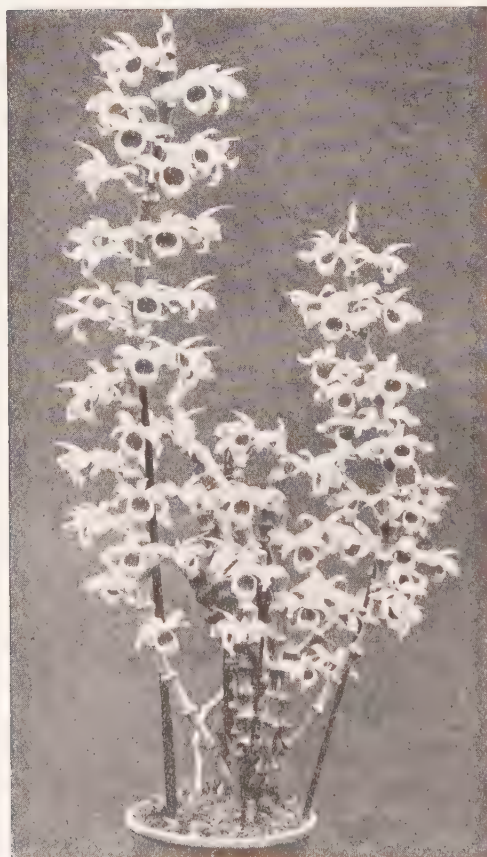
CYMBIDIUM.—Sturdy sedge-like plants, among which are some of our handsomest garden Orchids.

C. Devonianum.—Flowers in pendulous racemes; greenish, spotted purple, lip purplish-crimson. Khasia Hills. I.
C. eburneum.—Very large, white, often marked with yellow and purple on the lip. Khasia Hills. I.
C. erythrostylis.—White, lip crimson. Annam. I.
C. giganteum.—Yellow and red-brown. Himalaya. I.
C. grandiflorum (*Hookerianum*).—Himalaya. I.
C. insigne (*Sanderi*).—White, with crimson lines. Annam. I.
C. Lowianum.—Green, with red-brown lip. Burma. I.
C. Tracayanum.—Buff, with red markings. Burma. I.

By crossing *C. insigne* with other species numerous hybrids of great horticultural value have been obtained. They are easily grown in a cool house, and they flower in winter, lasting a long time.

CYPERORCHIS.—Related to *Cymbidium*, and including *C. Mastersii* and *C. elegans*, both white-flowered and Burmese. I.

CYPRIPEDIUM.—A varied genus, comprising many species. There are two distinct sections.

Fig. 189.—*Cyripedium Actæus*Fig. 190.—*Cyripedium glaucophyllum*Fig. 191.—*Dendrobium crassinode*

viz. *Cyripedium* proper, of the *C. barbatum* and *C. insigne* class, all natives of the East; and *Selenipedium* of South America, of which *S. caudatum* is a familiar example. There is also a third section, of which the hardy *C. Calceolus* and *C. spectabile* are typical.

- | | |
|--|---|
| <i>C. barbatum</i> . — Mount Ophir. I. | <i>C. Lawrenceanum</i> . — Borneo. W. |
| <i>C. bellatulum</i> (fig. 173). — Shan States. I. | <i>C. Lowii</i> . — Borneo. W. |
| <i>C. Chamberlainianum</i> . — Sumatra. W. | <i>C. Mastersianum</i> . — Malaya. W. |
| <i>C. Charlesworthii</i> . — Shan States. I. | <i>C. niveum</i> . — Penang. W. |
| <i>C. concolor</i> . — Moulmein. W. | <i>C. philippinense</i> . — Philippines. W. |
| <i>C. Curtisii</i> . — Sumatra. W. | <i>C. Parishii</i> . — Burma. W. |
| <i>C. Dayanum</i> . — Borneo. W. | <i>C. purpuratum</i> . — Hong Kong. W. |
| <i>C. Druryi</i> . — S. India. W. | <i>C. Rothschildianum</i> . — North Guinea. W. |
| <i>C. Fairieanum</i> (fig. 176). — Assam. C. | <i>C. Sanderianum</i> . — Malay Archipelago. W. |
| <i>C. glaucophyllum</i> (fig. 190). — Java. W. | <i>C. Spicerianum</i> . — Assam. I. |
| <i>C. Godefroyæ</i> . — Cochinchina. W. | <i>C. Stonei</i> . — Borneo. W. |
| <i>C. hirsutissimum</i> . — Khasia. W. | <i>C. venustum</i> . — Sylhet. I. |
| <i>C. insigne</i> . — Northern India. C. | <i>C. villosum</i> . — Moulmein. I. |

Hybrid *Cyripediums* are both numerous and popular. The species cross readily with each other, and the hybrids intercross just as readily. Consequently, there are many multiple or secondary hybrids. They are not all beautiful, some being unattractive both in form and coloration, but the popularity of the genus is such that even ugly-flowered mongrels are cultivated. *Cyripediums*, with few exceptions, are among the easiest of orchids to cultivate. Most of them bloom in winter, and this adds to their value. They are grown to supply flowers for market, some of the showier kinds being in great demand. A full list of the hybrids is given in Sander's *List of Orchid Hybrids*, which also furnishes the parentage of each, the name of the raiser, and the year in which it was first shown. In 1916 over 2000 named hybrid *Cyrip-*

pediums had been recorded. A small selection is here given:

Actæus (fig. 189).	Lathamianum.
Arthurianum.	Lecanum.
Alcibiades.	Lord Ossulston.
Aureum.	Maudiae.
Beryl.	Milo.
Boltoni.	Minos.
Estella.	Mrs. F. Sander.
Euryades.	Niobe.
Fowlerianum.	Rossetti.
Fletcherianum.	St. Alban.
Gaston Bultel.	San Actæus.
Helen II.	William Lloyd.

Four of the best *Cypripediums* for beauty of

<i>D. aggregatum</i> .—Burma. I.	<i>D. Findlayianum</i> .—Burma. I.
<i>D. aureum</i> .—India, Ceylon. I.	<i>D. formosum</i> .—India. I.
<i>D. Bensoniæ</i> .—Burma. I.	<i>D. infundibulum</i> .—India. I.
<i>D. bigibbum</i> .—Australia. W.	<i>D. lituiflorum</i> .—India. I.
<i>D. Brymerianum</i> .—Burma. I.	<i>D. MacFarlanei</i> .—Ceylon. W.
<i>D. chrysanthum</i> .—India. I.	<i>D. MacFarlanei</i> (Johnsonæ).—New Guinea. W.
<i>D. chrysotoxum</i> .—Burma. I.	<i>D. moschatum</i> .—India. I.
<i>D. crassinode</i> (fig. 191).—Aracan. I.	<i>D. nobile</i> (fig. 177).—India and China. I.
<i>D. Dalkousianum</i> .—Burma. I.	<i>D. Phalenopsis</i> .—N. Guinea. W.
<i>D. Dearei</i> .—Philippines. W.	<i>D. Regium</i> .—India. W.
<i>D. densiflorum</i> .—Nepaul. I.	<i>D. superbiens</i> .—Australia. W.
<i>D. Devonianum</i> .—India. I.	<i>D. thyrsiflorum</i> (fig. 192).—Burma. I.
<i>D. Falconeri</i> .—India. I.	<i>D. Wardianum</i> .—India. I.
<i>D. Farmeri</i> .—Himalaya. I.	
<i>D. fimbriatum</i> .—Nepaul. I.	



Fig. 192.—*Dendrobium thyrsiflorum*

flowers, combined with a good constitution, are Harefield Hall, Sanderæ, Maudiae, and Lecanum. The most elegant is *Fairieanum* (fig. 176), and the most useful is *insigne*.

DENDROBIUM.—An extensive and showy genus of epiphytes, among the most popular in gardens. The deciduous species, such as *D. nobile*, require a long rest after growth; the intermediate evergreen species, such as *D. densiflorum*, a shorter rest in a cool place, but not to be severely dried; the warm-house species should be retained in a fairly warm temperature, even while resting, the necessary check being given by withholding water after the growths are matured.

The hybrids, especially those bred from *D. nobile*, are numerous, and they are most in favour as they are good growers and very decorative.

Hybrids of garden origin:

<i>Ainsworthii</i> .—(aureum × nobile).
<i>Aspasia</i> .—(aureum × Wardianum).
<i>Chesingtonense</i> .—(aureum × Wiganiae).
<i>Chlorostele</i> .—(Linawianum × Wardianum).
<i>Euryclea</i> .—(lituiflorum × Wardianum).
<i>Golden Ray</i> .—(Euryalus × signatum).
<i>Melpomene</i> .—(Ainsworthii × signatum).
<i>Ophir</i> .—(signatum × aureum).
<i>Queen of Gatten</i> .—(Cybele × signatum).
<i>Royal Sovereign</i> .—(Curtisii × Regium).
<i>Rhodostoma</i> .—(Huttonii × sanguinolentum).
<i>Sibyl</i> .—(bigibbum × Linawianum).
<i>Thwaitesiae</i> .—(Ainsworthii × Wiganiae).
<i>Venus</i> .—(Falconeri × nobile).
<i>Wiganiae</i> .—(signatum × nobile).

DISA.—Terrestrial Orchids, chiefly South African, among which are many handsome species, which, however, are difficult to cultivate. *D. grandiflora* is one of the most lovely

scarlet Orchids known; it should be grown as a marsh plant in boggy peat in a cold airy greenhouse. It forms the type of the leafy evergreen section, all of which require similar treatment, as *D. graminifolia* does of the grassy-leaved, which, however, require to be kept warm and dry while at rest. Of the leafy evergreen class *D. grandiflora*, scarlet; *D. tripetaloides*, white and purple; *D. racemosa*, bright rose-pink; *D. crassicornis*, white and purple; and *D. longicornu*, white or blue, are the handsomest: of the grassy-leaved, *D. graminifolia*, blue; *D. lacera*, blue; *D. lugens*, blue and green; *D.*

E. Stamfordianum.—Yellow, purple. Guatemala. I.
E. vitellinum.—Orange. Mexico. I.
E. Wallisii.—Yellow and purple. Colombia. I.

EPILÆLIA (*Epidendrum* × *Lælia*).

EPIPHRONITIS (*Epidendrum* × *Sophronitis*).

EULOPHIELLA.—A Madagascar genus, of which the only known representatives are the white-flowered *E. Elisabethæ* and the gigantic *E. Peetersiana*. They require great heat and moisture. *E. Rolfei* is a handsome free flowering hybrid between the two species. It was raised by Charlesworth in 1915.

GRAMMATOPHYLLUM.—A small genus of noble



Fig. 193.—*Lælia pumila*

porrecta, orange; and *D. pulchra*, a magnificent species resembling a *Gladiolus*, lilac and rose.

Several beautiful hybrids have been raised in gardens, viz. *Blackii* *Diores*, *Kewensis*, *Luna*, *Premier*, *Veitchii*, &c.

EPICATTLEYA (*Epidendrum* × *Cattleya*).

EPIDENDRUM.—A very large and widely distributed genus, some of the species being showy, but most of them are only of botanical interest. One of the handsomest is *E. bicornutum*, which bears long spikes of large wax-like white flowers.

E. atropurpureum (*macrochilum*).—Rose, purple, and white. South and Central America. I.

E. aurantiacum.—Orange. Guatemala. I.

E. ciliare.—White, fragrant at night. Tropical America. I.

E. dichromum.—Rose with purple lip. Brazil. I.

E. Endresii.—Small stems; white, violet spots. Costa Rica. I.

E. nemorale.—Rosy-mauve, streaked purple. Mexico. I.

E. prismatocarpum.—Green, chocolate, and rose. Chiriqui. I.

E. radicans (*rhizophorum*).—Scarlet. Guatemala. I.

E. Schomburgkii.—Vermilion. Guiana. I.

tropical epiphytes, ornamental in growth and showy in flower. *G. speciosum* is by far the largest-growing Orchid known, but it is a shy flowerer under cultivation.

G. Ellisii (*Grammangis*), fig. 181.—Brown and yellow. Madagascar. W.

G. Fenzhanum.—Green and chocolate. Malaya. W.

G. multiflorum.—Brown, green, and yellow. Philippines. W.

G. speciosum.—Yellow and red. Malaya. W.

HABENARIA.—A large genus of terrestrials, many of which are hardy. The tropical species are *H. militaris*, scarlet; *H. carnea*, blush-white; *H. c. nivos*, white; *H. rhodocheila*, scarlet; and the large white *H. Susannæ*.

HOULETTIA.—A singular genus from Brazil and Colombia, of which the large and purple *H. Brocklehurstiana* is the best known. I.

LÆLIA.—This showy genus vies with *Cattleya* in popular favour, and by crossing the two genera many showy hybrids have been produced. All



Fig. 194.—*Masdevallia ignea*



Fig. 195.—*Miltonia vexillaria*, var.

require the intermediate house; the Mexican species should be grown in full sunlight, the others lightly shaded during the height of summer.

- L. alba*.—White and rose. Mexico. I.
L. anceps.—Rose and purple, variable. Mexico. There are a great number of varieties, ranging from pure-white to the brightly-coloured typical form. Of these *alba* (fig. 166), *Davsonii*, *Sanderiana*, and *Stella* are the best. I.
L. autumnalis.—Rose and white. Mexico. I.
L. crispa.—White, purple, and yellow. Brazil. I.
L. Gouldiana.—Purple. Mexico. I.
L. harpophylla.—Orange. Brazil. I.
L. Jongheana.—Rose and yellow. Brazil. I.
L. majalis.—Rose and white. Mexico. I.
L. monophylla.—Orange-scarlet. Jamaica. I.
L. Perrini.—White and purple. Brazil. There are white varieties of this. I.
L. præstans.—Rose and crimson. Brazil. I.
L. pumila (fig. 193).—Rose and crimson. South America, I.
L. purpurata.—White, lilac, and purple. Brazil. I.
L. superbiens.—Rose. Guatemala. I.
L. tenebrosa.—Brown, white, and purple. Bahia. I.

Many hybrid *Lælias* have been raised by crossing the species, but far more have resulted from crossing them with *Cattleyas*, the two genera being nearly allied.

- Euterpe*.—(*crispa* × *Dayana*).
Latonia.—(*cinnabarina* × *purpurata*).
Olivia.—(*crispa* × *xanthina*).
Oreomiana.—(*Dayana* × *xanthina*).
splendens.—(*purpurata* × *crispa*).
vitelina.—(*harpophylla* × *Perrini*).

LÆLIO-CATTLEYA.—The name given to hybrids between *Lælia* and *Cattleya*. A few of the best are:

- Aphrodite*.—(*purpurata* × *C. Mendelii*).
Baroness Schröder.—(*Jongheana* × *C. Trianae*).
Britannia.—(*Canhamiana* × *Warscewiczii*).
callistoglossa.—(*purpurata* × *C. Warscewiczii*).
Canhamiana.—(*purpurata* × *C. Mossiae*).
Clive.—(*præstans* × *C. Dowiana aurea*).
Ernestii.—(*flava* × *C. Percivaliana*).
Eximia.—(*purpurata* × *C. labiata*).
Fascinator.—(*purpurata* × *C. Schröderæ*).
Golden Oriole.—(*Charlesworthii* × *C. Dowiana*).
Haroldiana.—(*tenebrosa* × *C. Hardyana*).
Hippolyta.—(*cinnabarina* × *C. Mossiae*).
Lady Rothschild.—(*Perrini* × *C. Warscewiczii*).
Nysa.—(*crispa* × *C. Warscewiczii*).
Pizarro.—(*Jongheana* × *C. Dowiana aurea*).
Veitchiana.—(*crispa* × *C. labiata*).

LYCASTE.—A useful genus from tropical America, requiring to be grown in the cool end of the intermediate house.

- L. aromatica*.—Yellow. Mexico. I.
L. costata.—Ivory-white. Peru. I.
L. cruenta.—Yellow. Guatemala. I.
L. Deppet.—Green, brown, and yellow. Mexico. I.
L. plana.—Green, brown, crimson. Bolivia. I.
L. Skinneri.—White to rose and crimson. Guatemala. I.

MASDEVALLIA.—A dwarf leafy evergreen genus, chiefly inhabiting the mountains of South America, and including some of the most quaint and singular as well as the most brilliant-flowered of Orchids. They require to be kept moist all the year. The *Chimæra* class grow best in baskets.

- M. bella*.—Cream, white, purple. Colombia. I.
M. Chimæra.—Yellow and purple. Colombia. I.
M. coccinea (*Harryana*).—Scarlet. Pamplona. C.
M. Davisii.—Yellow. Peru. C.
M. Ehippium.—Yellow, purple. Ecuador. C.
M. Estrade.—Yellow and mauve. Colombia. C.
M. hieroglyphica.—Purple. Colombia. C.
M. ignea (fig. 194).—Orange-scarlet. Colombia. C.
M. macrura.—Yellow and purple. Colombia. C.
M. Mooreana.—Green and purple. Colombia. C.
M. O'Brieniana.—Yellow and crimson. C.
M. racemosa.—Bright-scarlet. Popayan. C.
M. rosea.—Rose. Ecuador. C.
M. Schlimi.—Yellow and red. Colombia. C.
M. Tovarensis.—White. Venezuela. C.
M. Veitchiana.—Orange and mauve. Peru. C.

About fifty hybrids have been bred in gardens, half a dozen of the best being:

- Chelsoni*.—(*Veitchiana* × *amabilis*).
Courtauldiana.—(*rosea* × *caudata*).
Gairiana.—(*Veitchiana* × *Davisii*).
Ignæa-Estradæ.—(*ignæa* × *Estradæ*).
Kimballiana.—(*Veitchiana* × *caudata*).
Rushtonii.—(*ignæa* × *racemosa*).

MAXILLARIA.—A large genus, very easy to cultivate. The following are the showiest and most useful:

- M. grandiflora*.—White. Ecuador. I.
M. picta.—Cream, white, and purple. Brazil. I.
M. præstans.—Yellow and red. Guatemala. I.
M. Sanderiana.—White and purple. Ecuador. I.
M. tenuifolia.—Red-brown. South America. I.
M. venusta.—White. Colombia. I.

MILTONIA.—A genus with showy flowers. The Brazilian species require the shady side of the *Cattleya* house in a position near the roof-glass. Those from Colombia prefer a more moist and less airy situation.

- M. candida*.—Yellow, brown, white, and purple. Brazil. I.
M. Clowesii.—Yellow, brown, and purple. Brazil. I.
M. cuneata.—White and purple. Brazil. I.
M. Endresii (*Odontoglossum Warscewiczii*).—White and rose. Central America. I.
M. Phalenopsis.—White and purple. Colombia. W.
M. Regnellii.—White and purple. Brazil. I.
M. Roezlii.—White, yellow, and purple. Colombia. W.
M. Schröderiana.—White, crimson, and brown. Costa Rica. I.
M. spectabilis.—White and rose. Brazil. I.
 var. *Moreliana*.—Rose and purple. Brazil. I.
M. vexillaria (fig. 195).—White and crimson. Colombia. I.

MILTONIODA.—The name given to several hybrids between *Miltonia* and *Cochlidia*.

MORMODES.—A singular genus of the same general habits and requirements as *Catasetum* and *Cycnoches*, and exhibiting similar structural peculiarities in the flowers. I.

ODONTIODA.—Hybrids between *Odontoglossum* and *Cochlidia*, in which red is a conspicuous colour. A few of the best of these are *Armstrongii*, *Bradshawiæ*, *Brewii*, *Chantcler*, *Charlesworthii*, *Cooksoniæ*, *Gattonensis*, *Heatonensis*, *Joan*, *Pandora*, *Red Cross*, *Sultan*, *Vuylstekeæ*.

ODONTOGLOSSUM.—A very popular genus with generally showy flowers. The most beautiful and varied is *O. crispum*, the varieties of which are very numerous.

- O. blandum*.—White and purple. Colombia. C.
O. Cervantesii (fig. 196).—White, red, and yellow. Mexico. C.
O. cirrhosum.—White and purple. Ecuador. I.
O. citroszum.—White and rose. Mexico. I.
O. cordatum.—Brown, yellow, and white. Mexico. C.
O. coronarium.—Brown and yellow. Colombia. C.
O. crispum (fig. 165).—White and various. Bogota. C.
O. grande.—Yellow and brown. Guatemala. C.
O. Hallii.—Brown, yellow, and white. Ecuador. C.
O. Harryanum.—Yellow, chocolate, and purple. Colombia. C.
O. Insleayii.—Yellow and brown. Mexico. C.
O. Kramerii.—Rose. Costa Rica. I.
O. luteo-purpureum.—Colombia. C.
O. nexum.—White, freely spotted. Colombia. C.
O. nebulosum.—White and brown. Mexico. C.
O. Oerstedii.—White. Costa Rica. C.
O. Pescatorei.—White and purple. Colombia. C.
O. polyanthum.—Yellow and brown. Ecuador. C.
O. pulchellum.—White. Guatemala. C.
O. ramosissimum.—White and purple. Colombia. C.
O. Rossi.—White, brown, and rose. Mexico. C.
O. triumphans.—Yellow and brown. Colombia. C.
O. Uroskinneri.—White, brown, and rose. Guatemala. C.

There are a very large number of artificially raised hybrids which eclipse in beauty the pure species. A few of the best of them are *ardentissimum*, *bellatulum*, *Dusky Monarch* (fig. 197), *Gladys*, *King Albert*, *Solon*, *Victory*, *Conqueror*,

Cooksonii, *excellens*, *Harryano*, *crispum*, *Gladys Pittianum*.

ODONTONIA.—Hybrids between *Odontoglossum* and *Miltonia*, in which the broad, flat labellum of the *Miltonia* is a conspicuous character. A few of the best are *Charlesworthii*, *Cybele*, *Lairessæ*, *Magali Sander*, *Roger Sander*, and *Scylla*.

ONCIDIUM.—A large genus of epiphytes inhabiting chiefly Central and South America, and composed of groups very dissimilar in growth and flower, from the fleshy terete-leaved *O. Jonesianum* to the broad succulent-leaved *O. Lanceanum*, both of which groups exhibit little trace of pseudobulbs, to the large-bulbed *O. macranthum* and *O. tigrinum*; from the miniature *O. Limminghei* to the stately *O. ampliatum majus*. Whilst some prefer the cool house others thrive best in warmth. All, however, may be grown in an intermediate house.

- O. bicallosum*.—Yellow. Guatemala. I.
- O. bifolium*.—Yellow and brown. Monte Video. I.
- O. Cavendishianum*.—Yellow, brown spots. Guatemala. I.
- O. Cebolleta*.—Rush-leaved; flowers yellow. Brazil. I.
- O. cheiroporum*.—Yellow. Chiriqui. C.
- O. concolor*.—Yellow. Organ Mountains. C.
- O. crispum*.—Yellow and brown. Organ Mountains. I.
- O. cucullatum*.—Rose and purple. Ecuador. C.
- O. curtum*.—Yellow and brown. Organ Mountains. C.
- O. dasytyle*.—Pale-yellow and chocolate. Organ Mountains. C.
- O. flexuosum*.—Yellow. Brazil. I.
- O. Forbesii*.—Yellow and brown. Organ Mountains. I.
- O. Gardneri*.—Yellow and brown. Organ Mountains. C.
- O. incurtum*.—Rose and white. Mexico. C.
- O. Jonesianum*.—White and brown. Paraguay. I.
- O. Kramerianum*.—Yellow and chestnut-red. Ecuador. W.
- O. Lanceanum*.—Rose-purple and brown. Surinam. W.
- O. leucochilum*.—White and brown. Guatemala. C.
- O. Loxense*.—Orange, green, and brown. Loxa. C.
- O. macranthum*.—Yellow and purple. Ecuador. C.
- O. Marshallianum*.—Bright-yellow. Organ Mountains. C.
- O. ornithorhynchum*.—Rose-purple. Mexico. C.
- O. ornithorhynchum album*.—White. C.
- O. Papilio*.—Yellow and red-brown. Trinidad. W.



Fig. 196.—*Odontoglossum Cervantesii*



Fig. 197.—*Odontoglossum Hybrid (Dusky Monarch)*

- O. Phalænopsis*.—White and purple. Ecuador. C.
O. sarcodes.—Yellow and brown. Organ Mountains. C.
O. serratum.—Brown. Ecuador. C.
O. splendidum.—Yellow and brown. Guatemala. I.
O. superbiens.—White, brown, and purple. Colombia. C.
O. tigrinum.—Yellow and brown. Mexico. C.
O. varicosum.—Yellow, red-brown spots; very fragrant. Brazil. C.
O. Wentworthianum.—Yellow and brown. Guatemala. C.

Several hybrid *Oncidiums* have been raised in gardens, the best being *Macbeanianum*.

ONCIDIODA.—Hybrids between *Oncidium* and *Cochlidia*, a few of which are *Bella*, *Cora*, *Charlesworthii*, *Maurice*, and *Waltonensis*.

PERISTERIA.—A small genus requiring the same treatment as *Lycaste* and *Phaius*. The stronger growers should have fibrous loam, peat, and sphagnum.

- P. aspersa*.—Yellow and chocolate. Venezuela. I.
P. cerina.—Yellow. Central America. I.
P. elata.—White. The Dove Orchid. Panama. I.
P. pendula.—French-white and purple. Demerara. I.

PESCATOREA.—A small genus of leafy evergreen epiphytes closely related to *Zygopetalum*. They require to be grown in a moist shady house.

- P. cerina*.—Yellow. Veragua. W.
P. Dayana.—Cream-white. Colombia. W.

- P. Klabochorum*.—White and crimson. Ecuador. W.
P. Lehmannii.—White and violet. Colombia. W.

PHAIUS.—A variable genus related to *Calanthe*, the two having been hybridized successfully.

- P. grandifolius*.—Buff and purple. India and China. I.
P. Humblotii.—White and rose. Madagascar. W.
P. maculatus.—Yellow. India. C.
P. tuberculosus.—White, yellow, and purple. Madagascar. W.
P. Wallichii.—White, buff, and purple. India. I.

Hybrids of garden origin: *amabilis*, *Cooksoni*, *maculato-grandifolius*, *Marthæ*, *Norman*, *Oak-woodsensis*.

PHALÆNOPSIS.—A noble genus with short stems, flat fleshy sheathing leaves, in several species prettily marbled with grey. Their flowers are generally large, arranged elegantly on long, arching spikes. They are known as *Moth Orchids*.

- P. amabilis (grandiflora)*.—White. Java. W.
P. Aphrodite (amabilis).—White. Manila. W.
P. Lowii.—Rose and purple. Burma. W.
P. Luddemanniana.—White and purple. Philippines. W.
P. rosea.—Rose. Manila. W.
P. Sanderiana.—White and rose. Philippines. W.
P. Schilleriana (fig. 198).—Rose. Manila. W.
P. speciosa.—White and crimson. Malaya. W.
P. Stuartiana.—White and brown. Mindanao. W.

- P. tetraspis*.—White. Andaman Isles. W.
P. violacea.—White and violet. Sumatra. W.
P. violacea, var. *Schröderiana*. Rose. W.

PLATYCLINIS (*Dendrochilum*).—A small genus of which the yellow *P. filiformis* and the white *P. glumacea* are cultivated for their elegant, fragrant flowers.

RENANTHERA.—Erect-growing tropical epiphytes, related to *Vanda* and requiring similar treatment.

- R. coccinea*.—Stem climbing; scapes long, branched, many flowered, flowers bright-red. Burma. I.
R. Imshootiana (fig. 199).—Like *R. coccinea*, but smaller. Cochinchina. I.
R. Lowii (Arachnanthe).—Leaves long, arching; scapes long, pendant; flowers fleshy, yellow, blotched red. W.

RESTREPIA.—Dwarf with evergreen leaves of similar habit to *Masdevallia*. The quaint insect-like flowers of *R. antennifera* are very attractive. C.

RODRIGUEZIA.—A small genus of dwarf evergreen epiphytes, more commonly known in gardens as *Burlingtonia*.

SACCOLABIUM.—Evergreen epiphytes with fleshy distichous leaves and arching axillary spikes of closely set flowers.

- S. ampullaceum*.—Rose, spotted crimson. Himalaya. I.
S. bellinum.—White, purple, and yellow. Burma. I.
S. coeleste.—Blue. Siam. I.
S. curvifolium.—Orange. India. I.
S. giganteum.—White and crimson. Burma. I.



Fig. 198.—*Phalænopsis Schilleriana*

Fig 19.—*Renanthera Imschootiana*

- S. guttatum*.—White and rose. Java. I.
S. Hendersonianum.—Rose. Borneo. W.
S. violaceum.—White and rose. Manila. I.
 „ var. *Harrisonæ*. White. I.

SCHOMBURGKIA.—*Cattleya*-like in habit, with long flower-spikes. *S. tibicinis*, the bulls'-horn Orchid, has hollow, curved, horn-like pseudobulbs, and wavy flowers coloured red-brown. Native of Honduras.

SCUTICARIA.—Stems short, leaves long, rush-like, pendent; flowers on short stalks 3 inches across, yellow, spotted with red-brown. *S. Steelii* and *S. Hadweni*, both natives of South America. W.

SELENIPEDIUM.—Now generally included in the genus *Cypripedium*, although structurally different. The foliage is bright-green, and the petals of most of the species are curiously prolonged.

- S. Boissierianum*.—White and green. Peru. W.
S. caudatum.—Yellow, white, brown. Ecuador, Peru. I.
S. Lindleyanum.—Pale-green, red-brown. Guiana. W.
S. longifolium.—Green, white, brown. South America. W.
S. Schlিমii.—White-rose. Ocaña. C.

Hybrids of garden origin:

- cardinale*.—(*Sedenii* × *Schlিমii* *albiflorum*).
Dominianum.—(*caricinum* × *caudatum*).
Grande.—(*longifolium* × *caudatum*)
Schröderæ.—(*caudatum* × *Sedenii*).
Sedenii.—(*Schlিমii* × *longifolium*).

SOBRALIA.—A noble genus with tall bamboo-like stems furnished with evergreen, ovate plicate leaves and large generally fugacious flowers.

- S. leucoxantha*.—White and yellow. Costa Rica. I.
S. Liliastrum.—White. Guiana. I.
S. macrantha.—Rose and purple. Mexico. I.
S. xantholeuca.—Yellow. Colombia. I.

There are several hybrids of garden origin, such as *Charlesworthii*, *dellense*, *Veitchii*, and *Wiganæ*.

SOPHRONITIS.—Dwarf evergreen epiphytes, of which the scarlet *S. grandiflora* is a general favourite. They thrive best in small pans or baskets suspended near the roof of a cool house.

- S. cernua*.—Red. Brazil. C.
S. grandiflora.—Scarlet. Organ Mountains. C.
S. violacea.—Violet. Organ Mountains. C.

SOPHROCATTLEYA.—Hybrids between *Sophronitis* and *Cattleya*, which combine the large flowers of the latter with the bright-crimson of the former.

SOPHROLÆLIA.—Hybrids of similar character to the last-named.

STANTHOPEA.—Extraordinary plants, producing pendulous spikes of large wax-like flowers. They require to be grown suspended in baskets.

- S. Bucephalus*.—Yellow and red. Ecuador. W.
S. Devonensis.—White and purple. Mexico. W.
S. eburnea.—White. Trinidad. W.
S. insignis.—Ivory-white and purple. Ecuador. W.
S. oculata.—Yellow and red. Mexico. W.
S. tigrina.—Yellow, chocolate, and crimson. Mexico. W.

THUNIA.—Tall-stemmed, terrestrial, deciduous, with long lanceolate leaves and pendulous terminal heads of flowers.

- T. alba*.—White with crimson lines on lip. India. I.
T. Bensonæ.—Rose and purple. Rangoon. I.
T. Marshalliana.—White and yellow. Burma. I.
T. Veitchiana (hybrid). I.

TRICHOPILIA (including *Pilumna*).—Compact-growing, leafy epiphytes, with fragrant flowers.

- T. brevis*.—White, yellow, and brown. Peru. I.
T. coccinea.—White and red. Central America. I.

T. crispa.—White and crimson. Central America. I.
T. fragrans (*Pilumna*).—White and yellow. Colombia. I.
T. hymenantha.—White and purple. Colombia. I.
T. marginata.—Crimson and white. Chiriqui. I.
T. suavis.—White and rose. Costa Rica. I.
T. tortilis.—White and crimson. Mexico. I.

VANDA.—A large, handsome genus with woody stems, distichous leaves, and showy flowers.

V. Parishii var. *Marriottiana*. Rose-purple. Burma. I.
V. Sanderiana.—Rose and brown. Mindanao. W.
V. suavis (fig. 200).—White, brown, and rose. Java. I.
V. teres.—Rose, crimson, and yellow. India. W.
V. tricolor.—Yellow, brown, and rose. Java. I.

ZYGOCOLAX.—Hybrids between *Zygopetalum* and *Colax jugosus*.

ZYGOPETALUM.—A showy genus in which *Pro-*

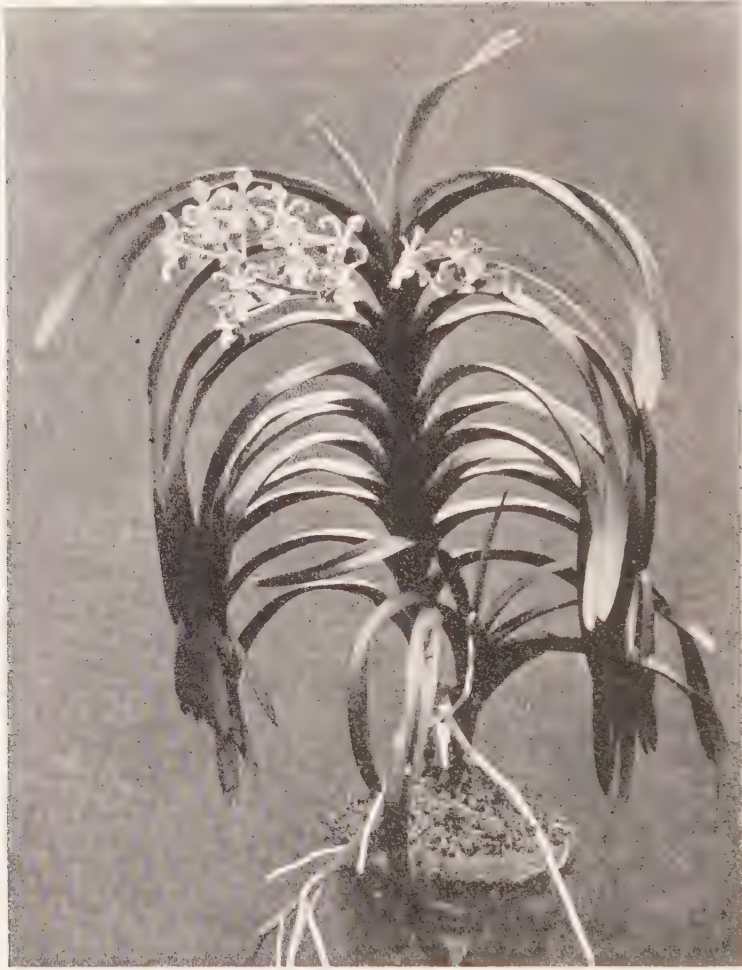


Fig. 200.—*Vanda suavis*

Some of the species are very popular, being easy to grow and sure flowerers.

V. Amesiana.—White. Shan States. I.
V. Bensoni.—Yellow and brown. Burma. I.
V. cœrulea.—Blue. Khasia Hills. I.
V. cœrulescens.—Blue. Burma. I.
V. Denisoniana.—Ivory-white. Arracan Mountains. I.
V. Hookeriana.—White, rose, and purple. Borneo. W.
V. insignis.—White, yellow, and rose. Timor. I.
V. Kimballiana.—White and purple. Shan States. I.
V. Lowii.—Yellow and red. Borneo. Also known as a *Renanthera*. W.
V. Parishii.—Yellow and brown. Burma. I.

menœa, *Bollea*, *Pescatorea*, and *Warscewiczella* are now included.

Z. (Batemannia) Burtii.—White, yellow, and brown. Costa Rica. W.
Z. (Batemannia) meleagris.—White, yellow, and brown. Brazil. W.
Z. Burkei.—Green, white and red. Guiana. I.
Z. crinitum.—Green, brown, white, and purple. Brazil. I.
Z. grandiflorum.—Green, brown, and purple. Colombia. I.
Z. Mackayii.—White, green, and purple. Brazil. I.
Z. maxillare.—Green, brown, and violet. Organ Mountains. I.
Z. rostratum.—Greenish-brown and white. Demerara. I.



Fig. 201.—View in Tropical Fern House, Kew

FERNS

From the point of view of decorative foliage plants, the great family of Ferns is one of the main contributors to the immense amount of material which we nowadays possess. In the extraordinary diversity of form, size, habit of growth, simplicity or complexity of make and even in some cases range of colour, no class of plants equals the Ferns, not only in their marvellous specific diversity, but still more in the further diversity which has been developed by the peculiar mutational capacity of many of their species. Of this capacity the selective cultivator has taken advantage to the great enhancement of their characters, by obtaining through their spores, offspring which vary both ways, some reverting more or less towards the ancestral form, while others present new characters. Hence in many cases the results of selective propagation are frequently so different from the normal, that no one ignorant of their pedigree would credit their origin.

It will be of interest to dwell a little upon the history of Ferns. They are the undoubted progenitors of all flowering plants,

while they themselves have been evolved from primarily lower forms of spore-bearing vegetation, such as the seaweeds and algæ, which under persistent aqueous conditions of existence have survived in innumerable forms. There is no branch of palæological study which gives us so appalling an idea of the immensity of time involved in the evolution of life from the very beginning as that of the fossil plants. With the animal world we can trace a distinct progression from one geological age to another, and, when we compare the earliest forms of animal life we know of with those of to-day, we find an enormous difference, so great indeed that we are probably safe in asserting that no form of animal life at present existing could be for a moment mistaken for one existing at the time of the earliest known geological deposits in which any animal life is visible at all.

With Ferns the extraordinary fact is clearly demonstrated by myriads of examples, that, though they form the chief material of the coal measures, they were then apparently quite as far advanced in the evolutionary

scale as those of the present age, from which it needs a keen eye in many instances to detect a difference, and that, when detected, will be no greater than now exists between the species themselves. Beyond the Ferns and their allies of the coal forming period, when they must have constituted the great bulk of terrestrial vegetation, we cannot penetrate; but, judging by the imperceptible alteration evolved in the subsequent period, it is impossible to form an idea of the length

constructed on exactly the lines of a Fern. Fertilization is effected by a travelling spermatozoid instead of the male germ being carried all the way by a pollen tube. The immense range of the coal fields which exist in many parts of the world represents what we may term primeval Fern forests of great area and of often immense duration. These were, however, subjected to changes of level which alternatively overlaid and temporarily destroyed them as forests,



Fig. 202.—Tree Ferns

of the previous period required to transform a seaweed from a water plant into a beautifully cut fern adapted for scattering its spores through the air on dry land. On the other hand, the link between Ferns and Seaweeds is maintained in the fact that complete submersion of the reproductive apparatus in water is absolutely essential.

Cycads show a sort of half-way transformation from Ferns to Flowering Plants in their frond-like foliage and certain peculiarities in their reproductive characters. *Ginkgo biloba*, the Maidenhair Tree, one of our rare Conifers, is, however, perhaps the most marked existing link remaining. Although a true Conifer or Pine tree, attaining a huge size, its leaves are con-

bequeathing them eventually to mankind as coal seams.

In these days we regard Ferns as merely decorative foliage plants. In former years collections of Ferns were an important feature in gardens of the wealthy. They are less popular now, although a number of easily grown species are still grown for decorative purposes, and here and there the Fernery is maintained as a worthy department in the art of gardening.

Propagation.—Nature has been peculiarly liberal to Ferns in the provision of means of reproduction. The more important is the spore or Fern seed. An estimate of the annual crop of one of our native Lady Ferns (*Athyrium filix fœmina*) gives the number

of spores at about one thousand millions, and each one of these spores could, with luck, spontaneously produce a plant. In point of fact, however, this prodigality is counterbalanced by the extreme minuteness and delicacy of the spores, and by the feeble-

usually of a brown colour, and these capsules are as a rule grouped together under a skin-like cover, the indusium, which when they are ripe is generally pushed aside, the capsule being thus exposed. Each capsule contains several scores of spores, so that in



Fig. 203.—Life History of a Fern

1, A fern-prothallium seen from the under side; 2, an archegonium in longitudinal section; 3, an antheridium; 4, escape of spermatozoids from antheridium; 5, young sporophyte with first leaf arising from the prothallium; 6, complete sporophyte of *Asplenium Ruta-muraria*; 7, under surface of pinnule of same, showing linear sori and lateral indusia; 8, a young prothallium arising from a spore: the spore is below. 6, natural size; 1, $\times 8$; 2, 3, 4, $\times 350$; 5, $\times 6$; 7, $\times 3$; 8, $\times 240$

ness of their start in life, so that instead of invading all available space with their hordes of youngsters the average remains unaltered.

Spores as a general rule are found in dots or lines or marginal patches on the under side of the fronds. The spores themselves, hardly visible to the naked eye, are contained in little oval shaped capsules

a tree Fern with its immense crop of fronds the number would be quite incalculable. To collect the spores for sowing, snip off a section of a fertile frond bearing ripe capsules and lay this back downwards on a glass slip or a piece of smooth paper, covering with glass. In a few hours the paper will be seen to be stained apparently with the

spores, the capsules having dried and burst and expelled their contents. Then prepare small pots or pans by draining them with crocks in the usual way and filling them with good fern compost, loam and leaf-mould, flattening this down with the bottom of another pot. Then place a small piece of paper on the surface to prevent disturbance, and pour boiling water upon this until it runs out scalding hot at the bottom, remove the paper, cover the pan with a piece of glass, and let the soil get cold. By this means the soil is completely sterilized. The spores are scattered thinly and evenly over the surface of the soil, the glass cover is replaced, and the pot is stood in a shady position. A faint green flush will appear on the soil in a week or two, and this will be followed by the appearance of tiny green scales adhering to the soil, which, if they have space, will each attain the size of a herring scale, but if, owing to thick sowing, they are crowded, small patches of them should be taken out with the point of a knife and inserted an inch or so apart into other pots prepared and sterilized as described. Presently from these scales (prothalli), which bear practically microscopic flowers, male and female, young ferns will be developed, and all that is then needed is to give space for growing by pricking out and potting on as required. Despite every care, alien spores from other ferns will find a way into the pot, and their sporelings should be removed.

Spores from good varietal forms are liable to vary again in their progeny, and a careful look-out for these should be kept. The spore sowings must on no account be watered from above so as to disturb the young prothalli. To obviate this, the pots are placed in saucers in which a little water is kept, or a number of small pots, large enough to accommodate in the first stage a hundred or more young plants each, may be bedded in coco-nut fibre in a larger pan, deep enough to contain them, and by keeping the fibre constantly moist and covering the whole batch with a single pane of glass suitable conditions are provided. The better the light, bar direct sunshine, the healthier will the development be. If, as sometimes happens, the prothalli remain for a long time after assuming full size without showing any evidence of fronds, the pots should be immersed up to their rims in tepid water, until it percolates upwards to the under sides of the prothalli. By thus wetting them the necessary aid to fertilization is furnished, failure having been due to

dry aerial conditions at the critical period.

Cross Fertilization or Hybridization.—Ferns of different species can be crossed with each other. Crosses between distinct varieties of one and the same species have also yielded very charming combinations. This being so it is probable that good results would be arrived at by combination between hardy and exotic species of the same genus. The difficulty that spores of different species are apt to germinate after shorter or longer periods and if sown together for the prothalli to mature at different times can be got over by successional sowings, sowing the slower grower earlier than the faster so that they mature simultaneously. When simultaneous sowing is practicable, it is a good plan to flood the prothalli as above suggested at the critical period, so as to provide a chance for the travelling male germs of one prothallus to reach the female ovum on another. Owing to the minuteness of the operation it is hardly possible to transfer, as can be easily done with pollen grains, the fertilizing influence from one prothallus to another with any reasonable certainty of success.

Propagation by Vegetative Means.—In addition to the spore there are other means of propagation, mostly of a much simpler character, and as these involve the utilization of what are practically parts of the individual Fern, they are the more to be relied upon to produce the parent characters. Bulbils or young plants common to all flowering plants in the axils of their leaves are by no means rare in the Fern world. They may be produced on the foliage itself as in *Asplenium bulbiferum*, also on roots. These bulbils are buds or incipient crowns, deriving nourishment from the parent plants, but provided with the means if brought into contact with the soil of rooting into it and becoming independent plants. All that is necessary is to snip off the young plants with a small piece of the parental frond, insert them into soil and keep them close until rooted. Bulbils appear on various parts, some Ferns producing them on top of the fronds, as in *Woodwardia radicans*. *Struthopteris germanica* produces underground runners or stolons. *Nephrolepis* produces stolons which do not burrow but travel like strawberry runners and by means of buds yield plants as they proceed. Some Ferns which produce substantial caudices or rootstocks, the Lady Fern for instance, will multiply by a process of fusion or splitting, one crown dividing into two, twin centres of growth having in some way

been produced. In such a case it is necessary to wait until each has developed so to speak a neck of its own, when with care they can be separated. Fine specimen plants of crown-forming Ferns may be grown by keeping them to a single crown, and this enhances their size and beauty. With some kinds, such for instance as the Shield Ferns (*Polystichum*), no bulbils are produced, whereas amongst the varietal sports bulbils

but if the living ones be pressed downwards they will snap off and come away each with a little bundle of dead roots. An old crown will yield scores of these according to its age. After trimming off the roots and washing them, if these bases are dropped into a wide-mouthed glass pickle jar or a tumbler with a couple of inches of washed silver sand at the bottom, and covered with a piece of glass, in a short time little white pimples



Fig. 204.—A Golden Hart's-tongue Fern

are in some cases abundant on the fronds. In all these examples of bulbil formation, we have proof that Nature goes farther in providing for the resurrection, so to speak, of damaged or apparently damaged plants. The common Hart's-tongue (*Scolopendrum vulgare*) when left alone may in time produce a bunch of fronds springing from several centres of growth. Connected by a rootstock mainly consisting of remainders of the old and long dead frond stalks, these remainders being still green, of a sausage shape and about an inch long, all attached to a fleshy central core which they enwrap or rather cover in a symmetrical spiral fashion. At the very bottom some may be quite dead and decayed,

will appear on every base. These are incipient bulbils which may be used for propagation. This faculty is not confined to the Hart's-tongue, many of the caudex-producing Ferns having a like faculty, if trimmed free of all decayed matter, washed, and subjected to close moist treatment. An old worn-out plant of *Lastrea montana*, with a great mass of caudex from which all the living crowns had been removed, was thrown aside as worthless, but happening to find suitable conditions in a moist frame, in a few weeks it developed hundreds of buds on the old stems, a valuable lesson, as this species is by no means easily raised from spores.

STOVE AND GREENHOUSE FERNS

Exotic Ferns, that is, such as are not indigenous to Great Britain consist of course of genera and species ranging from tropical ones requiring constantly a high temperature under glass to perfectly hardy ones, which thrive in climates much more severe in the winter than ours. Others of the warm temperate regions grow well in conserva-

varieties. The generic name *Adiantum* is derived from a Greek word meaning dry, as the fronds are not easily wetted.

A. capillus veneris.—The only British member of the genus, but found only on our warmest coasts. It has sported into several fine forms, such as *cornubiense*, a small imitation of *A. Farleyense*; *daphnites* and *imbricatum*.

A. cuneatum (G).—This most popular species is peculiarly fitted for room decoration as well as



Fig. 205.—*Adiantum Farleyense*

tories where frost is excluded. Hence garden Ferns are divided into three classes, Stove, Greenhouse, and Hardy, with which we will now deal, grouping the first two together. To grow these successfully the minimum winter temperature should not fall below 55° to 65° for the Stove, while a minimum of 45° suffices for the Greenhouse. They are distinguished here by (S) and (G) respectively.

ACROSTICHUM (S).—Distinguished by bearing two distinct kinds of fronds, fertile contracted ones and leafy barren ones, or fronds partly barren and leafy with contracted fertile terminals.

ACTINIOPTERIS radiata (S).—A very pretty dwarf fern, but a few inches high, consisting of small radiating palm-like fronds.

ADIANTUM.—One of the most popular genera, containing many delicately beautiful species and

the cool conservatory. The best varieties of it are *grandiceps*, a tasselled form; *gracilis*; *grandis*; *dissectum*; *micropinnulum*; *erectum*; and *major*.

A. decorum.—A pretty, large pinnuled form.

A. dolabriforme (G) has a similar habit to *A. cuneatum*, but is otherwise very distinct.

A. Farleyense (S) (fig. 205).—A variety of *A. tenerum* and the Queen of the Maidenhairs, is really the true plumose or barren form of that species; the pinnules are very large, pink when young, while the sub-pendulous fronds are so graceful that the Fern is absolutely unrivalled. There is a reputed sport from it called *gloriosum* (G) which runs it close, and will grow well under greenhouse treatment. *Macrophyllum* (S), though not large in frond, has comparatively immense pinnules and is very handsome. Of this there is a form striped with white.

A. Luddemannianum.—Presumably a sport from *capillus veneris*, with dense, curiously twisted pinnules.

A. lunulatum (S) is distinct, the pinnules being

crescent or half-moon shaped, whence the specific name. It grows pendulously, forming long narrow fronds with proliferous tips.

A. Mayii (G).—A plumose form with congested fronds.

A. pedatum (G).—A native of North America and perfectly hardy in this country, but it merits glass protection as, unless in very sheltered positions, out-of-doors it cannot display its full beauty; deciduous.

A. reginae (G) is a grand, bold-growing form.

A. Sancta Catharina (S) is a fine bold grower with large pinnæ, but has a strong feline odour which is not a recommendation.

A. scutum (tenerum) (S) is the parent of *Farleyense* and like it except that the pinnules are smaller.

much nobler. *Var. multilobatum* is a branched, tasselled form of it.

A. præmorsum laceratum (S).—A very handsome Fern.

CHEILANTHES (G).—Peculiar in its power to withstand dry treatment, the species growing wild in comparatively dry rocky chinks much exposed to hot sun and drought. The fronds of some of the species are very finely dissected and powdered with white or yellow dust. *C. elegans* is appropriately named the Lace Fern.

CIBOTIUM (G).—A genus of Tree Ferns related to *Dicksonia*. *C. Barometz* has such thick, fleshy, woolly crowns and branching rootstocks that, in the old days, it was supposed to produce young lambs. *C. regale*, *C. Schiedeii*, and *C. spec-*



Fig. 206.—*Asplenium nidus avis*, var.

A. Versaillese (G).—A dense crested form presumably of *cuneatum*.

A. Williamsii (G).—Resembles *A. cuneatum* closely, except that it is powdered with golden-yellow dust.

ASPLENIUM.—The Spleenworts, though of various specific forms, have not been liberal in garden sports.

A. bulbiferum (G).—A most popular Fern owing to the fact that, besides being tough, of pretty habit, and almost hardy, it bears an abundant crop of young plants on its fronds, and is thus easily propagated. Some of its near relations similarly gifted are: *A. viviparum*, *A. diversifolium*, and *A. flaccidum*.

A. caudatum (S).—Fronds pendulous, with proliferous tips, a handsome basket Fern.

A. hemionitis (G).—A distinct species with triangular undivided fronds. There is a tasselled variety known as *cristatum*.

A. Mayii (G).—Very elegant, deep glossy green, tough in texture.

A. nidus avis (G) (fig. 206).—The Birds'-nest Fern, with fronds on Hart's-tongue-like lines but

tabilis are large growers, requiring much head room.

CYATHEA dealbata and *C. medullaris* (G) are the two famous New Zealand Tree Ferns. They are excellent for a large conservatory.

CYRTOMIUM (G).—There are three species of this genus, which is a branch of the Aspidium or Shield Fern family. *C. falcatum* is a handsome, dark-green Fern, much grown for decoration. Two garden varieties of it are *Mayii* and *Rochfordii*, a plumose form. *C. caryotidium* has longer divisions of a light non-lucent green. *C. Fortunei* is finely divided and the texture is of papery consistency.

DAVALLIA.—A large and variable genus, in size ranging from the minute and finely dissected *D. parvula*, about 1 inch high, up to immense specimens 3 feet or more in height and more thorough; they are, however, all alike in having creeping rootstocks and spores contained in marginal pockets. They are epiphytic, growing on tree trunks or spongy surfaces which encourage root extension and free spread of frondage to the light and air.



Fig. 207.—*Davallia canariense*

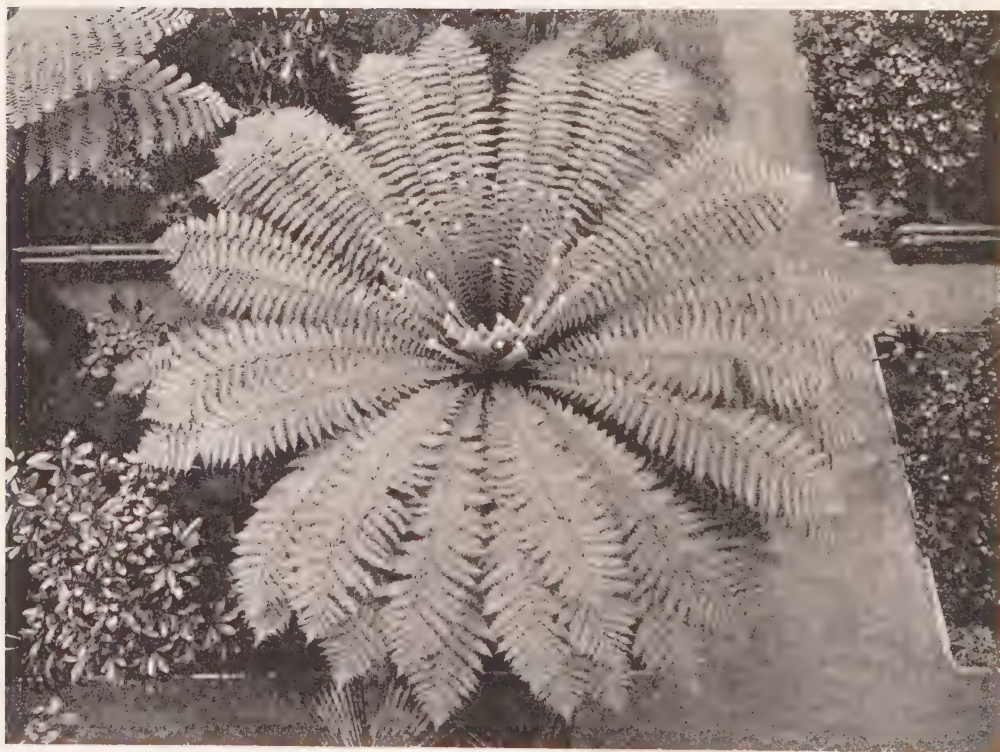


Fig. 208.—*Dicksonia antarctica*, seen from above

D. bullata (G).—A small fronded species; the brown furred tips of the extended rootstocks resemble squirrels' feet.

D. canariense (G) (fig. 207).—The familiar Hare's-foot Fern, and is one of the largest of the genus.

D. dissecta.—An elegant plant with finely divided fronds and brown, scaly, creeping rhizomes.

D. fijiensis (S) forms a grand specimen. It has sported into a number of very charming varieties, of which *gracillima*, *insignis*, *magnifica*, *nobilis*, *pulchra*, and *robusta* are favourites.

D. heterophylla (S) and *D. parvula* are examples of the dwarf section, and are very pretty.

D. Mariesii (G).—A delicate, small fronded species, of which there is a very prettily tasselled form.

D. solida superba (S).—The name gives no idea of the great age and beautifully lucent character of the fronds of this, one of the best of garden Ferns.

DICKSONIA antarctica (fig. 208) and *D. squarrosa* (G).—Two handsome Tree Ferns for the conservatory, growing tall, with large heads of spreading fronds. A constantly moist atmosphere is the main essential for Tree Ferns, as the root system lies mainly in the exposed stem.

DOODIA aspera (G).—A pretty little Blechnum-like Fern, of which there is a tasselled form known as *multifida*. *D. caudata* (G) is also worth growing.

DORYOPTERIS palmata (S).—A small-growing Fern with creeping rhizomes and tiny palm-like fronds only about an inch high.

GLEICHENIA (G).—The members of this genus appear in some parts of the world to take the place of our Bracken as a spreading Fern with travelling rootstocks, forming a dense mass from which spring wiry fronds of elegant construction; they are all very similar, differing only in minor details. They prefer a peaty soil and plenty of moisture.

GONIOPHLEBIUM.—A branch of the Polypodium family. *G. appendiculatum* (S) has very long feather-like fronds with forked pinnules and is a first-rate basket Fern. Var. *scriptum* has the veins brightly coloured.

G. subariculatum (S).—A noble Fern for suspended baskets, the fronds reaching 10 feet in length.

GYMNORGRAMMA (S).—This genus comprises a number of very beautiful tropical Ferns, including the so-called Gold and Silver Ferns, the fronds being covered with silver-white or golden-yellow powder. This powder is quite loose, and is probably intended to serve as an obstacle to insect attack. Its presence indicates more or less dry habitats, as rain dislodges it. Under culture syringing overhead must be refrained from. *Alstoni superba* (gold), *calomelanos* (silver), *chrysophylla* (gold), *Cordreyi* (sulphur), *elegantissima* (silver), *Mayii* (silver), *Peruviana* (sulphur), *schizophylla*, and *Wetenhalliana* (silver) are the best for gardens.

HYMENOPHYLLUM (G) (Filmy Fern).—There are many species from various parts of the world, but they are rarely seen now in cultivation, their requirements being too troublesome.

HYPOLEPIS millefolia (G).—A small-growing Japanese Fern with finely divided leaves. *H. repens* is smaller.

LASTREA.—(See *Nephrodium*.)

LITOBROCHIA vespertilionis (G).—Related to *Pteris*; it has a creeping rootstock and makes

a pretty little specimen under pot cultivation.

LOMARIA (G).—Closely allied to *Blechnum*, differing in that the spores, though borne on contracted erect fronds in the same way, are protected by a reflexed margin without an independent indusium. The barren fronds form a lax-spreading rosette, the fertile rising in the centre. They are borne on short slender stems, tree-fern like. The best are: *ciliata*, *gibba*, *media*,



Fig. 209.—*Lygodium dichotomum*

platyptera, *Herminierii*, *fimbriata*, *grandis*, *major*, and *princeps*.

LYGODIUM (S).—Climbing Ferns of elegant habit, fronds prettily fringed with long projecting sori. The best known are *dichotomum* (fig. 209), *japonicum*, *palmatum*, *scandens*, and *microphyllum*.

MICROLEPIA.—(See *Davallia*.)

MOHRIA caffrorum (G).—A pretty, dense-growing, much divided Fern from South Africa.

NEPHRODIUM.—An important genus embracing a large number of species, characterized by dot-like fructification covered by a kidney-shaped indusium. With few exceptions the most decorative are found among the British kinds. *Cicutarium*, *decompositum*, *dissectum*, *Duffii*, and *sanctum*



Fig. 210.—*Platycerium grande*



Fig. 211.—*Polypodium Knightae*

are the best of the tropical species. *N. molle* and its varieties, *corymbiferum* and *grandiceps*, are popular market Ferns.

NEPHROLEPSIS.—Several species of this tropical genus, and especially *N. exaltata*, have under cultivation sported in a most extraordinary manner. From the type with long, narrow pinnate or once-divided fronds a partially bipinnate sport, named *N. Piersoni*, originated in the United States. This was freely propagated, and among the young plants obtained there were found some with still more divided fronds. Other variants succeeded, among them being one named *Willmottæ*, in which the tall straggling fronds are transformed into a spherical mass, resembling a ball of the finest moss. At a recent exhibition (1918) about a hundred distinctly different fronds of sportive *Nephrolepis* were shown, the greater number of which were forms of *N. exaltata*.

Nephrolepis has consequently assumed first rank among decorative Ferns of easy propagation and culture, since all are stoloniferous. For baskets they are peculiarly adapted, though the more congested habit assumed by most of the sports fits them admirably for pot culture.

N. rufescens tripinnatifolia is one of the best of tropical basket Ferns.

NOTHOCHLÆNA (G).—The habitats of this genus are usually where climatic conditions are dry and warm, and the fronds are more or less clothed with protective white or brown scale, as in *Cheilanthes*. Treatment similar. *Chrysophylla*, *hirta*, *lanuginosa marantæ*, *nivea*, and *rufa* are species which are worth growing.

ONYCHIUM japonicum (G) is a pretty, slender-foliaged Fern from Japan.

OSMUNDA (G).—This genus—to which our familiar Royal Fern, *O. regalis*, belongs (see under Hardy Ferns)—consists of a few species, all hardy and moisture loving. Pretty forms are: *palustris congesta*, *Mayii*, and *japonica corymbifera*.

PELLÆA (G).—A genus of small Ferns which grow naturally in fairly dry conditions. The best are *densa geraniifolia*, *gracilis hastata*, *rotundifolia*, and *ternifolia*.

PLATYCERIUM.—An epiphytic genus, being always found attached to tree trunks, forming masses of broad barren fronds faced by new ones of two kinds, fertile and barren, the former being long, more or less pendulous, and branched like a stag's horns, whence the popular name. The backs of these fronds towards the tips are sometimes thickly coated with spores. The barren fronds are usually wide and rounded, but they sometimes assume other shapes. *P. alcinorne* bears cooler treatment than the other species,

the most striking of which are: *P. æthiopicum*, *P. angolense*, *P. biforme*, *P. grande* (fig. 210), and *P. Wallachii*. These must be fastened to blocks of peat or other congenial material, and are best suspended from the roof of a moist stove.

POLYPODIUM.—A large and varied genus, distinguished by having round or oval spore heaps unprotected by an indusium. Many species have small, simple fronds, as in *P. sigmaticum*, others grow to a great size and are of striking beauty.

P. irioides (S) and its varieties, *grandiceps* and *ramocrestatum*, are two finely crested forms.

P. Knightæ (S) (fig. 211).—A magnificent plant, with arching, finely cut fronds 6 to 8 feet long.

P. glaucum (G) and its varieties, *crispum*, *cris-tatum*, *magnificum*, *Mayii*, and *Mandianum*, the last named a magnificent sport with immense fronds, unique as regards habit, size, and free development.

P. Schneiderianum.—A hybrid between *P. glaucum* and *P. vulgare elegantissimum* is a greatly enlarged edition of the latter with all its fine cutting.

POLYSTICHUM.—A hardy genus, but the following may be grown in a greenhouse: *aristatum*, *variegatum lepidocaulon*, *mucronatum*, and *setosum*.

PTERIS.—A large and varied genus a few of which are popular trade Ferns for house decoration.

P. tricolor (S).—Fronds of three colours, difficult to grow to perfection.

P. argyræa (G).—Fronds tall, prettily variegated with white and green.

P. cretica (G).—Of this there are numerous varieties, the best being: *Alexandræ*, *Childsii*, *cris-tata*, *magnifica*, *major*, *Mayii*, and *nobilis*.

P. leptophylla princeps (G).—Very graceful.

P. longifolia (G) has long slender pinnate fronds.

P. scaberula (G).—The New Zealand Lace Fern, dwarf, very pretty.

P. serrulata (G).—Of this there are many varieties, the best being: *cris-tata*, *compacta*, *densa*, *gigantea*, *gloriosa*, *gracilis*, and *multiceps*.

P. tremula (G).—Another variable species, the best forms being: *crispa*, *flaccida*, *grandiceps*, and *Smithii*.

P. Wimsettii (G) and its varieties, *compacta* and *major*.—Three good market Ferns.

TODEA (G).—A small genus of diverse characters. The best known in gardens are *T. superba*, the king of all Filmy Ferns; *T. Fraseri*, *T. pellucida*, *T. grandipinnula*, and *T. Moorei*. These require plenty of atmospheric moisture.

TRICHOMANES.—A genus of Filmy Ferns. See under HARDY FERNS.

HARDY FERNS

The term "hardy" is understood to apply to those ferns that will bear with impunity the severest winter conditions in the British Islands without protection. Naturally it includes many Ferns that are not natives, also an immense number of sports from the comparatively few species, some 45 in all, which are natives. A good collection of hardy Ferns shows diversity

of type. The number of varieties or sports of British Ferns is said to be from four to five thousand, a large percentage of which have been considered sufficiently well marked to have distinctive names, though it is doubtful if the majority of them are worth it.

They include many that are inferior as garden plants, but yet are botanically interesting, since any permanent and inheritable

change of structure is of biological interest. By collecting and cultivating them the interest and value of British Ferns have been greatly enhanced.

ADIANTUM capillus veneris.—British Maiden-hair. See under *Greenhouse Ferns*.

A. pedatum.—A bold-growing, deciduous species, native of North America. Likes a moist shaded position out-of-doors; also does well in a pot under glass.

A. Williamsii.—A native of Peru but quite hardy; very beautiful, with fronds and stalks slightly powdered with golden-yellow dust. A most persistent grower though frozen hard every winter.

ALLOSORUS crispus, the Parsley Fern, can be grown well in the open by digging a hole a foot deep and filling it with good Fern compost, mixed with gravel. The bunchy roots are spread out on the top of this and covered entirely with a spadeful of gravel. It must have protection from bright sunshine and plenty of water. This Fern is usually found wild on the steep slopes of constantly sliding debris or mountain-sides.

ASPLENIUM hemionitis.—Fronds triangular and very pretty. The variety *cristatum* has tasselled tips.

A. adiantum nigrum.—A pretty wall or rockery Fern, of which the variety *grandiceps* is a crested form. Not easy to cultivate.

A. lanceolatum.—Rather difficult to cultivate. It likes the sea air.

A. marinum.—Pretty, leathery-fronded, found only on the coasts within reach of spray. Bears little or no frost under culture. The variety *plumosum* has larger, barren fronds.

A. fontanum.—Only reputedly British, a prettily divided species not easy to cultivate.

A. trichomanes.—A pretty little plant which is not difficult to grow in well-drained soil on chinks of rock work. The varieties, *incisum* and *cristatum*, have tasselled, finely cut foliage, and *Moulei* has very small pinnæ.

A. viride is very like the last-named, but is green-stemmed.

ATHYRIUM filix fœmina, the Lady Fern.—A species which has provided an immense number of beautiful and varied forms. The best are: *acrocladon*, *mico-glomeratum*, *clarissimum*, *cristatum*, *Craigii*, *conioides*, *corymbiferum*, *crispum*, *Elworthyi*, *fissidens*, *germanicum*, *grandiceps*, *halothrix*, *magnicapitatum*, *plumosum*, *superbum*, *Drueryi*, *pulcherrimum*, *regale*, *ramulosissimum*, *Victoriæ*, *todeoides*, *cristatum*, and *Vernoniæ*. *Victoriæ* is one of the most remarkable of the series, all its divisions being in duplicate, tasselled, and at right angles to each other, the frond thus presenting an arrangement of tasselled crosses.

A. Goringianum tricolor.—A North American pretty tricolor Fern, red, white, and green.

BLECHNUM spicant.—A tough fronded evergreen, little Fern, with slender, fertile fronds, the barren ones forming a rosette about a foot high. The best varieties are: *concinnum*, with fronds like strings of small scallop shells; *plumosum*; *cristatum*; *ramo-cristatum*; and *trinervis coronans*.

CYSTOPTERIS fragilis, the Brittle Bladder Fern, is of easy culture, but has the drawback of becoming brown and discoloured early in the summer. The variety *sempervirens* is evergreen under glass.

C. bulbifera.—A North American species.

Peculiar in forming little berries in the axils of its fronds, which drop off and produce plants.

G. montana.—A pretty little plant resembling the Oak Fern. It does well in a loose open compost not too moist.

LASTREA (Nephrodium).—A genus of many species, the British examples of which have sported freely.

L. aemula, the Hay-scented Fern, resembles a crested Buckler Fern. The fronds have a strong hay-like perfume. The variety *cristata* is prettily tasselled.

L. aristata variegata, from Japan, has prickly striped dark-green fronds.

L. dilatata (the Broad Buckler Fern).—Besides a number of sub-species, this has produced some good varieties, such as *crispa*, *crispato cristata*, *cristata*, *digitata*, *grandiceps*, *Howardæ*, and *lepidota*.

L. filix-mas (the Male Fern).—The commonest of all garden Ferns, being used by hundreds to fill up space in shady corners and places where sunshine is deficient. Some very good forms are: *Barnesii*, *cristata*, *grandiceps*, and *polydactyla*.

L. montana resembles the Male Fern in size and habit, but its side divisions commence close to the ground, and its colour is a yellowish-green, and it has a lemon-like odour. It does well in a loamy soil free from lime, and may be grown in pots. The best varieties of it are: *Barnesii*, *cristata grande*, *grandiceps*, and *ramo-cristata*.

L. prolifera, Japan, has tough, finely divided fronds, at the back of which bulbils are produced.

L. pseudo-mas, the hard Male Fern, is evergreen under glass. Forms of this are: *polydactyla*, *crispa*, *angustata cristata*, and *fimbriata*.

L. thelypteris (the Marsh Buckler Fern) differs from the others in having a creeping rootstock which thrives in actual mud. Fronds tall, long-stalked, and slender. Grows well on the margins of a pond.

LOMARIA alpina.—Like a small *Blechnum*. Makes pretty clumps a few inches high. There is a crested variety. *L. chilense* and *L. magellanica* are similar. Both produce offsets. All three are suitable for pot culture.

ONOCLEA sensibilis.—Fronds broad, pinnate, spore-bearing ones stiffer and contracted. Does well in the open, but its fronds are apt to become discoloured early in the year.

OSMUNDA.—Peculiar in having large barren fronds and others mainly fertile. Spores in round capsules in dense bunches, resembling a faded *Spiræa* inflorescence, hence the name of Flowering Fern. The most familiar species is the native *O. regalis*, the Royal Fern, a name well merited, as it grows 10 or 12 feet high. It prefers to have its great rootstocks (fig. 212) half in the water of a lake or running stream. Var. *cristata* has elegantly cut fronds. Exotic species are: *O. cinnamomomea*, *O. claytoniana*, *O. palustris*, and *O. japonica corymbifera*. *O. palustris Mayii* is a great curiosity, being a mass of tiny tassels on long slender stalks.

POLYPODIUM.—A very large genus, characterized by the spore-heaps being round or oval and quite devoid of any cover or indusium. Four species are natives of the British Isles.

P. phegopteris (the Beech Fern) and *P. dryopteris* (the Oak Fern) grow well in sheltered positions, or in pans in loose leaf-mould, as does also *P. calcareum* (the Limestone Polypody), if a little lime be added.

P. vulgare (the common Polypody).—The best forms of it are: the *plumose* or *cambricum* group, of which *Barrowii*, *Prestonii* and *Hadwini* are good examples. Crested varieties are: *cristatum*, *bifido multifidum*, *grandiceps*, and *Forsteri*. *Cornubiense* or *elegantissimum* bears fronds of three different kinds. *Trichomanoides* and *semilacerum* are two pretty bipinnate forms, and *pulcherrimum* resembles *cambricum*, but differs in being quite fertile.

POLYSTICHUM (*Aspidium*).—Characterized by having dot-like sori, with a circular indusium attached by a central stalk, and by the peculiar shape of the ultimate leaf divisions, these being like a fingerless glove fringed with points, the thumb sticking out at nearly right angles and

soil in the open. It is quite evergreen. It has produced many beautiful sports, most of which are suitable for pot cultivation under glass. The following rank with the élite: *cristatum* Wollastonii, *divisilobum plumosum* (fig. 213), *divisilobum adiantoides*, *acutilobum*, and *grandiceps*.

PTERIS.—Of this genus we have only one British species, *P. aquilina* (the Bracken), which grows, often with great luxuriance, on heaths and commons. The spores are in marginal lines, and are protected by the margins being rolled back to form an indusium.

The several varieties are: *congesta*, very dense and leathery; *grandiceps*, heavily crested and somewhat dwarf; *pericristata*, splendidly tasselled;



Fig. 212.—Rootstock of Royal Fern, *Osmunda regalis*

also pointed. There are three indigenous species. *P. lonchitis* (the Holly Fern) is only found wild on hills of some elevation, usually two or three thousand feet. Fronds dark-green, tough and shiny, the bristly divisions distantly resembling small Holly leaves. In rocky chinks under many conditions it does well in clean country air, but is generally a failure in town gardens.

P. aculeatum (the Hard Shield Fern).—Fronds narrowly lanceolate, the ultimate division stalkless, evergreen, forming a bold rosette. It has provided a few good varieties, of which the best are: *acrocladon*, *densum*, and *pulcherrimum*. They grow well in a conservatory, their finely cut fronds requiring shelter to enable them to show to best advantage.

P. angulare (the Soft Shield Fern).—Fronds of a much softer character and not so lucent as in *P. aculeatum*. The habit is also laxer, and the ultimate divisions smaller and distinctly stalked. Of easy cultivation, thriving in ordinary garden

and *glomerata*, in which the frond has its divisions in tight ball-like knots.

SCOLOPENDRUM (the Hart's-tongue) (fig. 204).—Here again we have only one native species, characterized by having the spore heaps arranged in line on each side the midrib, giving a resemblance to the legs of a centipede (*Scolopendra*), whence the botanical name. Normally the fronds consist of a fleshy stalk a few inches long, bearing a long, smooth-edged blade an inch or two wide, with two lobes at the base and tapering to a blunt point. It has sported into a great number of forms, with crests or tassels on all sorts of lines, branched, fan-shaped, and bunched, frilled or fringed. Those to be recommended for the garden, either out-of-doors or under glass, belong to the frilled or *crispum* section. The Hart's-tongue does well in good loam, provided it does not suffer from drought and is afforded a fair amount of protection from hot sunshine and wind.

STRUTHIOPTERIS (the Ostrich Feather Fern).—

The two species, *S. germanica* and *S. pensylvanica*, are very similar. They form erect rosettes of fronds, with the contracted, almost spike-like, fertile fronds in the centre. The plants are apt to spread by means of underground stolons, new specimens thus cropping up at a distance from the old crown.

TRICHOMANES radicans (the Killarney Fern).—This and *Hymenophyllum tunbridgense*, both native species of Filmy Ferns, require the same close treatment, owing to the extreme delicacy of their foliage and consequent need of moisture and shade,

specimen. Its fronds form a crown on the top of a short stout stem. Should be planted in good peat soil.

WOODWARDIA radicans.—This forms a handsome specimen in a cool greenhouse or in the open in such mild climates as Cornwall. The large, pendulous fronds are 7 or 8 feet long, each bearing one or more young plants at the apex, by which they can be easily propagated. Sporelings are easily raised, and, if grown singly in small pots, they are suitable for table decoration.



Fig. 213.—*Polystichum angulare, divisilobum plumosum*

their natural habitats being on rocks in cavern-like recesses where they get bathed by spray. The delicate fronds shrivel irrecoverably with the slightest drought, and a constantly moist atmosphere is indispensable. Under culture this is only attainable in a specially constructed house, a Wardian case, or beneath a bell-glass. *T. radicans* grows to a fair size with finely divided fronds nearly a foot long, springing singly from a slender rhizome. The rhizomes should be pegged down upon good peat turf. The soil must be kept moist and little or no air admitted. The Fern is perfectly evergreen, the fronds lasting for more than one season. *Hymenophyllum tunbridgense* is small and moss-like, with thin creeping rhizomes. The best way to install them is to spread them out flat, peg them down, and treat as directed for the Trichomanes.

TODEA superba, the Feather Filmy Fern of New Zealand and Australia, is quite happy if placed in a large case or in a sunken frame, and under good treatment will make a magnificent

SELAGINELLAS

Although popularly known as Ferns, the Selaginellas belong to a different natural order. There are over 300 species, some of which form minute tufts, whilst others have long scandent stems, copiously branched; many are of creeping (sarmentose) habit; all of them emit roots freely. The leaves are small and scale-like, arranged in two rows along the branchlets. The spores are borne in angular, generally conical spikes at the end of the leafy branches. Nearly a hundred species are in cultivation, but many of them are so much alike that for horticultural purposes the number might be reduced to about twenty. These would afford interest and be useful in various ways. Many

of them are suitable to be grown as big specimen plants, others make excellent basket plants, while the small creeping kinds may be employed to form carpets or cushions under large plants. A collection of them, such as that at Kew for instance, is as charming as anything in the Fernery.

Selaginellas are easily managed; they grow

forming broad shining dark olive-green fronds, almost black in the summer. Tropical Asia.

S. canaliculata.—Stems sarmentose, 3 to 4 feet long; branches 6 to 9 inches long, flexuose, clothed with bright-green oblong pointed leaves. East Indies.

S. caulescens.—Stem stout, branched above, the branches spreading horizontally, giving them the appearance of a large feathery frond, 8 inches wide. Malaya.



Fig. 214.—Group of Selaginellas

quickly, and they may be propagated to almost any extent in a short time. Any light, open soil suits them, the essential point being perfect drainage, so that frequent waterings, which the plants like, will not make the soil stagnant. If sturdy examples are wanted, it is necessary to propagate a fresh stock every year from cuttings which should be put in in February. They may also be raised from spores, but this is a slow and tedious method.

S. affinis.—Stems nearly a foot high, branched freely; leaves flat, overlapping, rather firm, bright-green; branches tasselled and twisted. Very elegant.

S. apus.—Stems slender, trailing, densely matted; leaves minute, pale-green. North America. *G.* (nearly hardy).

S. atroviridis.—Stems 6 inches high, branched,

S. convoluta (hygrometrica).—Stems densely tufted, forming a dwarf spreading rosette, 6 inches across, of pinnate branchlets. When dry, the branches curl inwards and form a ball, which is sometimes sold under the name of "Resurrection Plant", the branches spreading out flat when placed in water. Tropical America.

S. denticulata.—Stems densely matted, trailing, 6 inches long, pinnately branched; leaves subacute, an inch long, flat, toothed, bright-green, turning to bright-red when old. Mediterranean Region.

S. Emiliana.—Semi-erect, 9 inches high, the fronds as in *S. Martensii*, but more finely divided, and leaves smaller, slightly curled, pale-green.

S. grandis.—Stems 1 to 2 feet high, erect and unbranched, except near the top, where the branches are numerous and form a flat shell-like frond of a bright blue-green colour. Spikes large, tassel-like. Borneo.

S. haematodes.—Stems about a foot long, wiry, red, branched above and horizontal, forming hand-

some fronds a foot wide. A beautiful plant, which should be grown in a large mass. Peru.

S. inæqualifolia.—Stems erect, 2 feet high, branches alternate from the base upwards,



Fig. 215.—*Selaginella Willdenovii*

horizontal, 5 inches long, the branchlets forming an elegant frond 4 inches wide. India.

S. involvens (Veitchii).—Stems densely tufted, 2 to 6 inches long, branched from the base, forming a flat rosette; leaves thick, rigid, bright-

green; var. *texta* has long, unbranched, chain-like stems. Japan, China, &c.

S. Kraussiana.—The common "Lycopodium" of gardens, usually called *S. denticulata*. Stems trailing, flat, branched freely, bright-green, forming a turf-like mass. There are many varieties, of which *Brownii* is a compact and pretty one. Africa. Hardy in the warmer parts of England.

S. laevigata.—Stems erect, 12 to 18 inches long, branched only in the upper half, the branches spreading and forming a wide elegant frond in which the erect ridge-like rows of dark-green leaves are striking; var. *Lyalli* is a more graceful form. Madagascar.

S. Martensii.—Stems 6 to 12 inches long, the lower half prostrate, the upper erect, pinnately branched, flat, bright-green, the leaves crowded. A common garden plant, of which there are several varieties, including a variegated form, known as *S. Watsoni*. Mexico.

S. stenophylla.—Stems erect, 6 to 12 inches high, branched, as in *S. Martensii*, but more delicately divided and coloured pale-yellow; var. *albospica* has white tassel-like spikes. Mexico.

S. uncinata (*cæsia*).—Stems trailing, with alternate branches, 3 inches long, triangular in outline, covered with flat imbricating leaves of a steel-blue colour, varying with the light. A pretty and useful plant, easy to cultivate. China.

S. Wallichii.—Stems stout, 3 feet or more high, with horizontal alternate branches, which are frond-like, 9 inches by 3 inches, plumose, the tassel-like drooping spikes adding to their beauty. India.

S. Willdenovii (*cæsia-arborea*) (fig. 215).—Stems climbing, attaining a length of 20 feet or more, wiry when old reddish, bearing frond-like branches 2 feet long, the scale-like leaves of a steel-blue colour. It forms a tangle of stems and branches in a few months under liberal cultivation. India.

LYCOPODIUMS

A large genus represented in our native flora by the Club-Mosses (*L. clavatum*, *L. alpinum*, &c.). They are all of striking appearance and exceptionally interesting, but unfortunately they are difficult to cultivate. Some of the tropical species are, however, represented in botanical collections, where they are grown in teak baskets of sphagnum, and suspended near the roof-glass in a tropical moist house. Here they grow with vigour, pushing up annually their succulent stems clothed with Pine-like leaves and ultimately with terminal tassels of spore-bearing branchlets. The best of them are *L. Phlegmaria*, *L. squarrosus* and *L. taxifolium*.

PALMS

Palms form a distinct and important group in the vegetable kingdom. Over a thousand species are known, the majority of which are natives of tropical countries, and therefore in this country require a high temperature for their cultivation. A few are found in extra-tropical countries, and these may be grown in a greenhouse temperature. One species only, *Trachycarpus* (*Chamærops*) *excelsa* (fig. 216), a native of China, is sufficiently hardy to live out-of-doors in the warmer parts of these islands.

Although between four and five hundred species have been introduced into English gardens, only a few of them are included among popular garden plants. Like the Grasses and Bamboos, to which Palms are related, many of the species closely resemble each other in vegetative characters, differing only in their flowers and fruits.

Many of the species are, when fully developed, quite large trees, some having straight cylindrical trunks 50 feet high, supporting a large crown of pinnate or palmate leaves; but, as they assume a decorative character when small, they are cultivated for the ornamentation of rooms, &c. Such popular sorts as *Livistona sinensis*, *Seaforthia elegans*, *Cocos flexuosa*, *Kentia Fosteriana*, and *Trachycarpus excelsa* may be seen at Kew as large trees from 40 to 50 feet high.

With very few exceptions Palms are propagated only from seeds, which are imported in large quantities from countries where they grow freely. Many thousands of seeds are annually imported into England alone of such favourites as *Kentia*, *Cocos*, and *Phœnix*. The seeds should be sown in pans or boxes of loamy soil, and kept warm and moist until they have formed a leaf; they should then be planted singly in small pots. Tropical conditions are preferable for young seedlings of even temperate species until they have made two or

three leaves. All Palms without exception enjoy a strong loamy soil, and a liberal amount of moisture both at the root and overhead, and from germination onwards. Where large quantities of seeds are sown, a bed is prepared for them in a warm pit and the seeds are sown thickly on this. As the seedlings come up they are carefully drawn out of the bed and potted singly.

Plants intended for use in decoration when small should be grown in small pots. If potted firmly in good yellow loam, and fed with a concentrated manure such as guano or Clay's fertilizer, they make healthy growth when kept in pots which would otherwise be too small for them. They may be transferred to larger pots when the roots are so crowded as to lift the soil above the rim of the pot. This treatment may be continued when the plants are large. Growers of Palms for market obtain large specimens in pots which appear absurdly small by keeping the plants in small pots and feeding them liberally. Fertilizers in which nitrate of soda is a principle are excellent for producing rich green foliage.

If the plants are to be employed in the decoration of halls, staircases, or wherever the conditions are more or less trying, they should be prepared for this by exposure to light and a reduced temperature for a few weeks. Their treatment generally may be less liberal when once they have attained the desired size; but they must always be well supplied with water at the root. In dry rooms the pots containing the plants should stand in saucers containing water. Where convenient the plants should be changed from the decorating service to the greenhouse often enough to prevent permanent injury.

All the tropical species may be grown in a moist warm house, and, although they will bear exposure to bright sunshine, they are quite happy when shaded along with other

plants grown in tropical houses. Many Palms will endure a much lower temperature than they ever experience in nature; even distinctly tropical species will winter safely in houses in which the temperature falls to 55°.

Whilst pot or tub-culture for Palms is as

INSECT PESTS

All Palms are liable to the attacks of such plant-pests as mealy-bug, scale, thrips, and red-spider, and, although they do not suffer in health unless badly infested, the leaves are soon disfigured. Where there are not



Fig. 216.—The Chusan Palm (*Trachycarpus excelsa*) growing out of doors near London

a rule most convenient, they may be planted out in beds in tall conservatories and other lofty houses. For this purpose those species should be selected which are not likely to grow too large, or which can easily be replaced should their removal on this account be necessary. In the list which follows, the letter G indicates those species which may be grown in a conservatory, where the minimum temperature in winter is not below 45°.

many plants, periodical washing with strong soapy water will keep them clean. For large collections a weekly syringing with a solution of paraffin or quassia-chips, or soft soap and tobacco, serves as a preventive and does not hurt the plants. If the stems or old leaves are badly infested with scale, they may be painted over with a strong cream-like mixture of soft soap, sulphur, and warm water, which should be allowed to remain on a week or so; when washed off it will

bring away with it all the insects with which it has been in contact.

LIST OF PALMS

ACANTHOPHOENIX (Areca).—A small genus, found only in Mauritius and Bourbon. Mature examples have smooth stems 60 feet high, and pinnate leaves 6 to 12 feet long. Young plants have arched pinnate leaves clothed on both sides with long spines which are needle-like on the sheathing base of the leaf-stalk; the under side of the pinnæ is silvery. They require stove treatment. *A. crinita* (Herbstii), *A. rubra*.

ACANTHORRHIZA.—Two species are grown in gardens under the name of *Thrinax aculeata* and



Fig. 217.—*Acanthorrhiza aculeata*

T. arborea. They are natives of Central America, where they form tall trees with elegant palmately divided leaves. When young they are very useful for decoration, the under side of the foliage being silvery. *A. aculeata* (fig. 217) is easily raised from seeds which are produced freely by large plants of it cultivated in tropical gardens.

ARCHONTOPHOENIX.—Two well-known garden Palms are placed in this genus by botanists, namely, *Ptychosperma Alexandræ* and *Seaforthia elegans*. They are largely grown from imported seeds from countries where they have become naturalized. Full-grown specimens have stems 60 feet high, and large, stout, pinnate leaves. The seeds are pea-like with a mace-like covering. *A. Cunninghamii* (*Seaforthia elegans*), leaves green on both sides; *A. Alexandræ*, leaves glaucous beneath. G.

ARENGA.—Large trees with enormous pinnate leaves, the pinnæ with jagged ends, glaucous beneath, the leaf-stalk split at the base into numerous long black fibres, the strongest of which are used as arrows for blow-pipes. *A. saccharifera* yields the sugar known in India as "jaggery". Young plants are graceful and

sufficiently sturdy to bear rough treatment. They require a stove temperature. *A. Bonnetii*, *A. saccharifera*, *A. Wightii*.

ASTROCARYUM.—Stems of mature plants 20 to 40 feet high, with stout, flat, dark-brown spines in spiral rings; leaves arching, pinnate, very spiny, glaucous beneath. When young they are elegant and ornamental, notwithstanding their spines. Plants 10 feet high flower annually, their large, boat-shaped sheaths being remarkable. All natives of tropical South America. *A. aculeatum*, *A. Mexicanum*, *A. rostratum*.

ATTALEA.—Comprises about twenty species, all South American, with tall, ringed stems, and large, spineless, pinnate leaves. *A. Cohune*, the "Cohune Nut", develops noble leaves 20 feet long before it forms a stem. Young plants are of graceful habit, and sufficiently robust to be used for ordinary decorative work. Stove treatment. *A. Cohune*, *A. funifera*, *A. spectabilis*.

BRAHEA.—Closely allied to *Thrinax*. Fully developed plants have stems 30 feet high, surmounted by a head of fan-shaped leaves 7 feet across, rachis (leaf-stalk) short and stout, spinous. They are natives of Mexico, and thrive in a greenhouse temperature. *B. calcarata*, *B. dulcis* (*Thrinax aculeata*), *B. lucida*, *B. nobilis*.

CALAMUS.—A very extensive genus, confined chiefly to the tropics of Asia; mostly of climbing habit, some attaining a stem-length of several hundred feet. These stems are known as "Rattans", and are used, when split, for chair-bottoms, &c. When young they are invariably graceful, having slender, spinous leaf-stalks and elegant, pinnate leaves. *C. asperimus*, *C. ciliaris*, *C. Oxleyanus*, *C. tenuis*.

CARYOTA.—Large trees, sometimes of tufted habit, sometimes with single stems 50 feet high bearing enormous bipinnate leaves, the pinnæ shaped like fishes' fins. They are singular in their mode of flowering, growing to full height before developing enormous clusters of flowers from the top downwards. Young plants are invariably elegant and striking in being bipinnate. *C. ochlandra* from China may be grown in a greenhouse; the others are tropical. *C. Blancoi*, *C. Cumingii*, *C. majestica*, *C. mitis* (*sobolifera*), *C. ochlandra*, *C. Rumphiana*.

CHAMÆDorea.—About sixty species of erect, slender-stemmed Palms, all natives of Tropical America. They vary in height, and several are climbers; some have bilobed leaves, others are elegantly pinnate. They flower freely even when small; their spadices are bright-coloured, and the flowers are powerfully fragrant. Some are stoloniferous. *C. Arenbergiana*, *C. corallina*, *C. elatior* (G.), *C. Ernesti-Augusti*, *C. fragrans*, *C. gracilis*, *C. Sartori*, *C. scandens* (G.).

CHAMÆROPS.—Only one species rightly belongs to this, namely, *C. humilis*, interesting as being the only European Palm. In some parts of Sicily and Spain it spreads over the uncultivated sandy tracts just as the common Bracken does with us. It is hardy in South Cornwall and the Isle of Wight. There are numerous varieties, such as *macrocarpa*, *tomentosa*, *elegans*, &c. Excellent for a greenhouse or conservatory, as it grows slowly and rarely exceeds 12 feet in height.

CHRYSLIDOCARPUS (Areca) lutescens, of Madagascar, but now common in tropical countries. A most useful Palm, forming graceful tufts of yellowish Bamboo-like stems and elegant pinnate leaves, and it bears rough treatment very well. Small plants are much used for the

decoration of dinner tables. Market-growers often sow three seeds close together, and thus obtain attractive little triplet pot-specimens in about three years.

Cocos.—The thirty species include the "Coco-nut" (*C. nucifera*) and several of the most useful of all garden Palms, *C. Weddelliana* and *C. plumosa* being unrivalled as decorative plants. Some of the species form very large trees, *C. plumosa*, for instance, being represented at Kew by a giant 60 feet high, with dark-green plume-like leaves 20 feet long. *C. Weddelliana* rarely grows more than 6 feet high. It is raised from seeds in enormous numbers by nurserymen, being saleable when about two years old. All the species are natives of the western tropics, *C.*



Fig. 218.—*Geonoma gracilis*

nucifera being wild in most tropical countries. *C. campestris* (G), *C. insignis* (Glaziovæ), *C. nucifera*, *C. plumosa* (G), *C. Procopiana* (Marie-Rose), *C. Weddelliana*.

CYRTOSTACHYS.—A small Malayan genus of tufted habit, with pinnate leaves, the sheathing stalks of which are coral-red, hence the name of "red-stemmed palms". *C. Lakka*, *C. Renda*.

DÆMONOROPS.—Very similar to *Calamus*, and requiring the same treatment under cultivation. They are happiest in a hot, moist house. All the species are ornamental when small. *D. fissus*, *D. grandis*, *D. Jenkinsianus*, *D. Lewisianus*, *D. melanochaetes*.

DICTYOSPERMA.—Natives of the Mascarene Islands, where they grow to a large size. Under cultivation they are most ornamental when about a yard high, their pinnate, graceful leaves margined with yellow or dull-red being more elegant at that size than when larger. *D. aureum*, *D. furfuraceum*, *D. rubrum*.

DIPLOTHEMIUM.—*D. caudescens*, also known as *Ceroxylon niveum*, forms a magnificent specimen where room can be afforded, and even when small its bold, sub-erect leaves, rich black-green above, silvery beneath, are very striking. Large

plants have leaves 15 feet long and 4 feet wide. It is remarkable in having the pinnae set regularly and somewhat rigidly along the rachis from the base to the apex.

ERYTHEA.—Two handsome California Palms which have been called Braheas are rightly Erytheas. They have stiff, fan-shaped leaves, with spinous stalks. In bright sunlight the leaves are almost white. They grow slowly, and thrive in a conservatory. *E. armata*, *E. edulis* (*Brahea Roezlii*).

EUTERPE.—Two useful garden plants are members of this genus, viz. *E. edulis* and *E. oleracea*, the "Cabbage Palms" of South America. They have columnar, erect, ringed stems, graceful, pinnate, arching leaves, and are excellent plants for an intermediate house or stove, but they do not bear rough usage as well as many Palms. They are pretty when only a foot high.

GEONOMA.—A large genus of tropical American Palms of varying height and foliage, some being tall, whilst others are small and low growing; the leaves of some are elegantly pinnate, whilst in others they are simply bilobed. They are suitable for houses of ordinary size. Some of the best are *G. acaulis*, *G. baculifera*, *G. Carderi*, *G. gracilis* (fig. 218), *G. Pohliana*, *G. Princeps*, *G. Schottiana*, and *G. Seemannii*.

HOWEA.—The two Kentias, *Fosteriana* and *Belmoreana*, natives of Lord Howe's Island, are known botanically as Howeas. They are by far the most popular of all Palms, owing to their elegance from babyhood onwards, and their sturdiness, which enables them to undergo rough treatment. When full-grown they are 40 or 50 feet high, with rich-green pinnate leaves 8 to 10 feet long. They thrive in a house where the winter temperature does not fall below 50°; they are, however, at their best under tropical conditions.

HYOPHORBE.—Two species are grown in gardens as Arecas. They have thick, ringed stems and sturdy, pinnate leaves 8 feet long. Small plants have trigonous leaf-sheaths and gracefully arched leaves of a rich-green colour, with yellowish nerves. They require stove treatment. *H. amari-caulis*, *H. Verschaffeltii*.

KENTIA (see under *Howea*).—The only plants to be dealt with here are *K. elegantissima* and *K. Sanderiana*, both elegant, slender, pinnate-leaved tropical Palms from New Guinea. The latter when young is remarkably elegant on account of its long, tapering, narrow pinnae closely crowded together. It is one of the prettiest of Palms in a small state.

LATANIA (see under *Livistona*).—Three handsome tropical Palms from Mauritius constitute this genus; they have tall, unarmed stems and large, somewhat leathery, palmate leaves, devoid of spines. When young they are attractive on account of their rich glossy-green leaves, margined and lined with red or yellow. They are useful only for the ornamentation of large tropical houses. *L. Commersoni* (*rubra*), *L. Loddigesii* (*glaucophylla*), *L. Verschaffeltii* (*aurea*).

LICUALA.—Several of the thirty species known are grown in gardens, the most noteworthy being *L. grandis*, the "Round-leaved Palm", which has a slender stem and broad, rounded, plaited, glossy-green leaves. *L. elegans* and *L. horrida* are dwarf and of tufted habit. All the species are Eastern and distinctly tropical.

LINOSPADIX.—Two handsome Palms of recent discovery are *L. Micholitzii* and *L. Petrickiana*

(fig. 219) from New Guinea. They have bold, pinnate leaves elegantly arched and of a rich deep-green; the rachis is clothed with a net-

used in northern towns. They are very handsome when of large size. *P. Rabelini* is largely cultivated for table decoration, being the smallest and most elegant. *P. canariensis* (G), *P. dactylifera*, the Date-Palm (G), *P. humilis* (G), *P. reclinata* (G), *P. Rabelini*, *P. rupicola*, *P. spinosa*, *P. sylvestris*.

PRITCHARDIA.—Large trees from the Pacific Islands, remarkable for their pale-green palmate leaves, which on fully developed specimens are of enormous size. Young plants are attractive, but they are easily injured owing to their being somewhat succulent. They require tropical treatment. *P. aurea*, *P. macrocarpa*, *P. pacifica*, *P. Thurstoni*. (*P. grandis* of gardens is a *Licuala*.)

PTYCHORAPHIS.—Three species of this elegant Malayan genus have found favour in English gardens because of their graceful habit and pinnate leaves, in which respect they rival *Cocos Weddelliana* and *Geonoma gracilis*. They require tropical conditions, and they grow quickly from seeds into elegant little plants which may be used for the decoration of dinner tables, &c. *P. Augusta*, *P. Sanderiana*, *P. singaporensis*.

RHAPIS.—Two of the most useful Palms are *R. humilis* (fig. 221) and *R. flabelliformis*, both natives

work of brown fibre. The young leaves are of a rich brown-purple colour. Both grow well under tropical treatment.

LIVISTONA.—To this genus belong the *Latania*s and *Coryphas* of gardens. There are fourteen species, all natives of the Old World tropics, where they form large trees, with erect, ringed trunks and large crowns of palmate leaves, the stalks margined with spines. *L. chinensis* (*Latania borbonica*) is the common Fan-Palm, largely used in decorations of all kinds. It is one of the best-natured plants, thriving in a greenhouse or stove and bearing exposure wonderfully well. Seedlings should be grown on quickly in heat, as the plants do not develop into character until three or four years old. The same may be said of *L. australis* (*Corypha*), which has smaller, more rigid leaves and is perhaps slightly hardier. Other good garden Palms are *L. elata*, *L. Hoogendorpii*, *L. Jenkinsiana*, and *L. rotundifolia*.

MARTINEZIA.—A South American genus, worth a place among garden Palms on account of the distinctness, elegance, and bright-green character of its leaves. Fully developed plants have a slender trunk 20 to 30 feet high, clothed with rings of blackish spines and bearing a crown of pinnate leaves 5 feet long, the pinnæ exceptionally broad, lobed, and truncate, as in *Caryota*. *M. caryotaefolia*, *M. erosa*, *M. Lindenii* (fig. 220).

PENANGA.—Slender Palms, some of them dwarf and tufted. They are natives of tropical regions, and require stove treatment. Several are grown for their mottled leaves. *P. decora* (leaves reddish), *P. disticha*, *P. patula*, *P. Sanderiana* (leaves green-mottled red), *P. Veitchii* (leaves mottled).

PHŒNIX.—Old World Palms, varying in height from a few feet to large trees. They are all ornamental in a young state, and as they stand rough treatment well, several are grown in large quantities for furnishing purposes. In the south of France they are grown in trenches outside and kept very moist, treatment which causes them to grow quickly into well-furnished bushes; they are then lifted and planted in small tubs, to be



Fig. 220.—*Martinezia Lindenii*

of China, where they form clusters of slender, Bamboo-like stems clothed with small palmate leaves, which in *R. humilis* have the segments gracefully arched and attenuated, whilst in the other they are stiffer and less elegant. Both thrive under greenhouse conditions, and when

small are serviceable as table plants; they bear rough usage very well.

RHOPALOSTYLIS.—Two pinnate-leaved Palms known in gardens as *Kentia* or *Areca Baueri* and *sapida* belong to this genus; the former is a native of Norfolk Island, the latter of New Zealand. They are excellent for a large conservatory, where they may be planted out or



Fig. 221.—*Rhipis humilis*

grown in large tubs. They are less elegant than the Howeas (*Kentias*). *R. sapida* has narrower leaflets than the other.

ROSCHERIA melanochætes is a handsome tropical Palm from the Mascarene Islands, where it forms a slender tree 20 feet high, with large, spiny, flabellate leaves. It is sometimes grown in a tropical house, but is somewhat difficult to keep in health.

SEAFORTHIA.—See *Archontophoenix Cunninghamii*.

STEVENSONIA grandifolia is remarkable for its

large leaves mottled with red-brown, and also for the long spines which thickly clothe the leaf-stalks. It is a native of the Seychelles, where it forms a stem 50 feet high and a foot in diameter. In some gardens it still bears the name of *Phœnicophorum seychellarum*.

THRINAX.—All the species are elegant when young, and when fully developed they have few equals for gracefulness. Some of them grow to a height of 40 feet, whilst others, *T. Morrisii* and *T. pumilio* for instance, do not exceed a yard in height. They are easily distinguished from all other fan-leaved Palms by their slender, unarmed leaf-stalks and the brown, netted fibre which envelops the stem. They grow rather slowly when young. They are all natives of Tropical America and the West Indies. *T. argentea*, *T. barbadensis*, *T. excelsa*, *T. Morrisii*, *T. parviflora*, *T. pumilio*, *T. radiata*.

TRACHYCARPUS.—*T. excelsa* (fig. 216) is the commonest and most useful of Palms, and is known to most people as *Chamærops Fortunei*, the Chusan Palm, the only truly hardy Palm in this country. There are two very large examples, 45 feet high, in the temperate house at Kew, and these are interesting as being two of the first batch sent home from China by Fortune in 1845. Plants intended for planting permanently out-of-doors should be grown in a cool house for a few years.

VERSCHAFFELTIA splendida.—Another noble Palm from Mauritius, where it towers up to a height of 80 feet, its trunk a foot in diameter and elevated on stout roots. Young plants show the same peculiarity; they have large bilobed leaves, bright-green with reddish stalks and black needle-like spines.

WALLICHIA.—Dwarf tufted Palms, with long pinnate leaves, cuneate at the base, the apex jagged. They do best when planted in a border in a tropical house, where they form noble masses, suggesting gigantic Ferns. They develop large horse-tail-like bunches of flowers. *W. caryotoides*, *W. densiflora*, *W. disticha*.

WASHINGTONIA filifera (*Pritchardia*) is a noble Palm from California, now naturalized in various sub-tropical countries. It is one of the most effective trees in the south of France. The large bright-green palmate leaves are ornamented with long thread-like filaments. When young the plants should be kept under tropical conditions to induce them to develop quickly. They are somewhat thin for the first two or three years. Sometimes called *W. robusta* and *Brahea filamentosa*.

CYCADS

The Cycads are entitled to a place among garden plants for other reasons than that of ornament. They are the survivors of a very ancient race of plants, and are as remarkable botanically as living examples of Ichthyosaurus and Megatherium would be zoologically. "On purely morphological grounds we may regard *Cycas* as probably the most primitive type among recent flowering plants . . . showing a degree of antiquity altogether exceptional for a living genus" (Dr. Scott). Although they bear some resemblance to Ferns, and are popularly supposed to be Palms, their relationship is with Coniferæ. Except in their cones (fig. 223), however, there is no resemblance between these two orders.

The geographical distribution of Cycads is remarkable. They are most abundant in Africa, but they also occur in India, Malaya, Australia, Central America, the West Indies, Florida, China, and Japan. Several species of *Cycas* have stems sometimes 40 feet high, whilst the smallest are the *Zamias*, some of which are only a few inches high. Generally they have thick stems bearing broad crowns of pinnate, sometimes spinous, leaves, radiating from the centre like a Tree-Fern. The cones, usually large, are developed from the centre of this crown. They are invariably dioecious, that is, male and female cones on separate plants. The Australian genus *Bowenia* has a fleshy irregular rootstock and elegant bipinnate leaves 3 to 5 feet high. *Stangeria*, from South Africa, has a short fleshy stem and leaves so similar to those of some *Lomarias* that a German botanist named it *Lomaria eriopus*. It first produced a cone at Kew many years ago, when its relationship to *Cycas* was revealed.

As decorative plants Cycads are more in favour in Belgium, France, and Russia than in England. There are no nobler plants to be seen in the great Palm stove at Kew than the grand specimens of *Encephalartos* (fig. 222), *Cycas*, *Macrozamia*, *Ceratozamia*,

and *Dioon*. Many of them are ornamental when small, and some, *Cycas revoluta* for example, do not readily succumb to even the roughest treatment.

Another remarkable character in Cycads is that of the exceptional vitality in their stems, the tops of which may be cut off and treated as cuttings, whilst the beheaded trunk may be kept to supply stock by means of lateral growths. *Cycas revoluta* is most prolific when thus treated. It is cultivated in fields in Japan for exportation to Europe, especially Germany and Russia, where the leaves are in great demand for wreaths, &c. Imported stems of *Macrozamia*, *Encephalartos*, and *Cycas* have been known to remain dormant for three years and then start into vigorous growth. Seeds of the commoner species are sometimes imported in quantity, and afford a ready means of raising stock. The female cones in some of the species are large, and they assume a bright yellow or red colour when mature. They develop full-sized seeds even when not fertilized, but of course these are of no value for propagation.

The cultural requirements of Cycads are simple. They do not require much room at the roots, but they like a rich soil, well drained, and when growing they delight in daily supplies of water, both at the root and overhead. Liquid manure is helpful to them when new fronds are developing.

Cycas revoluta and *C. circinalis* retain their leaves for a number of years, but some of the species, *C. pectinata*, for instance, lose them as a rule every year. When the fronds sicken it may be taken as an indication that the plant requires a rest, which is afforded by withholding water for a few weeks. To start them into growth again they should be shaken out, repotted in fresh soil, placed in a warm, moist house—if plunged in a hot-bed so much the better—and watered, at first sparingly, increasing the supply as the fronds push into vigorous growth. Sometimes the stems decay at the base. They



Fig. 222.—*Encephalartos Hildebrandtii* (upper); *Zamia Kusteriana* (lower)

should then be renovated by cutting off the healthy upper part of the stem and planting it as a cutting. This may be done without risk, and is often advisable even for plants which do not show evidences of decay, but are nevertheless sickly. This tenacity of life in the stems of Cycads has its only parallel in the plants of one other order, viz. Cacti. The production of cones by Cycads sometimes results in the loss of the central bud, and all the fronds die. The stems will, however, often push out lateral

Where space can be afforded, this is a truly noble plant. There are several varieties of it. Other species are *C. Kusteriana*, *C. latifolia*, and *C. Miqueliana*.

CYCADS.—The distinguishing characters of this genus have already been mentioned. There are some twenty species known, all of them worthy of cultivation, the most popular being the following:

C. circinalis, longer and coarser in foliage than *C. revoluta*, and grow to a greater size; in Ceylon, its thick stem attains a height of 20 feet, and has a magnificent head of about eighty fronds 12 feet through.

C. pectinata from Sikkim is one of the most



Fig. 223.—Cones of Cycads

1. *Dioon edule*; 2. *Encephalartos horridus*; 3. *Cycas revoluta* (male); 4. *Cycas revoluta* (female)

growths, and fine heads have been developed by such decapitated stems.

Cycas differs from the other genera in having a conspicuous midrib extending up the whole length of the pinnæ. *Stangeria*, a South African genus, also has this character, but differs very markedly from *Cycas* in all other respects.

GENERA

BOWENIA.—Stem a fleshy tuber; leaves with smooth erect stalks 2 to 3 feet high, bearing a bipinnate frond-like blade 2 to 3 feet long and wide, the pinnules ovate elongate, shining-green. *B. spectabilis*, a native of North Queensland, is the only species; var. *serrulata* has toothed pinnules.

CERATOPHYLLUM.—Mexican plants with thick short trunks, bearing arching pinnate leaves, which vary with age in the length and size of the leaflets. The largest of all, *C. Mexicana*, when full grown, has leaves 12 feet long, and leaflets 2 feet long.

graceful of Cycads. A plant of it, with a stem only 1 foot high, will bear about twenty nearly upright leaves, each 8 feet long, of a rich deep-green, and as elegant as an ostrich plume.

C. revoluta.—The hardiest of all Cycads living in an ordinary greenhouse or dwelling-room, but most satisfactory when grown in a warm house where the whorls of leaves are produced in quick succession. Leaves used for church decoration remain perfectly fresh and green for a month, although not in water; they are also similarly employed when dead. The stem lives to a great age, increasing in height very slowly; one 10 feet high would probably be 100 years old. The female is commoner in cultivation than the male. A very fine male cone, 16 inches long, was developed by a plant in the Palm-house at Kew (see fig. 223, 3). The female has numerous short, comb-like, brown, velvety fronds in a cluster, bearing nut-like ovules (see fig. 223, 4).

C. siamensis is a native of Siam and Cochinchina, from whence its broad-based stems are sometimes imported. It bears elegant, bright-green, feathery fronds 4 feet long, and is said to be as hardy as *C. revoluta*.

DIOON.—The two species known have short,

thick stems and large, stiff, flat, pinnate leaves with spinous leaflets. The cones are as large as a man's head, and the scales are encased in thick felt-like hairs (see fig. 223, 1). There are striking examples of both at Kew, the newer one, *D. pectinatum*, being much the handsomer; it is distinguished by its larger toothed leaflets. Both species come from Mexico, and require stove treatment. *D. edule*, *D. pectinatum* (*spinulosum*).

ENCEPHALARTOS.—An African genus, of which the "Kaffir bread", *E. Caffer*, is the best known. All the species have thick trunks, and they live to a great age; there are examples at Kew which have been there over a hundred years. Generally the leaves are very rigid and spinous, *E. horridus* being of most forbidding aspect. Some of the species have finely divided elegant leaves, i.e. *E. Frederici-Guilielmi*, and *E. Ghellinckii*. Several may be grown in a greenhouse, although they are happiest under tropical treatment. *E. Altensteinii*, *E. Caffer*, *E. Frederici-Guilielmi*, *E. Ghellinckii*, *E. Hildebrandtii* (fig. 222), *E. horridus*, *E. Lehmanni*, *E. villosus*.

MACROZAMIA.—The Australian representatives of the order, several of them being among the handsomest of the Cycads. It would be difficult to find nobler foliage plants than *M. Hopei* and *M. Macleayi*. They all have very thick butt-like stems, and long pinnate leaves; some species, such as *M. Fraseri* and *M. plumosa*, have pinnules as narrow as in *Cycas*. They are all tropical. *M. flexuosa*, *M. Fraseri*, *M. Hopei*, *M. Macleayi* (*Denisoni*), *M. plumosa*, *M. spiralis*.

STANGERIA has already been described. *S. paradoxa* forms a handsome Fern-like specimen 6 feet through. It prefers hot, moist treatment.

ZAMIA.—The Western genus and by far the most variable. Generally the plants are not happy under cultivation. They prefer shade and moisture, and enjoy a decided rest in a lower temperature for a month or two after growth. The genus is a large one. The best-known species are *Z. Kusteriana* (fig. 222), *Z. latifolia*, *Z. Lindeni*, *Z. Loddigesii*, *Z. pumila*, *Z. pygmæa*, and *Z. Skinneri*.

SUCCULENT PLANTS

CULTIVATION

This term is applied to certain plants with fleshy leaves or stems, a character which enables them to support the peculiar conditions under which they are found wild. Their usual habitats are dry sandy and stony plains, waste rocky plateaux and crevices of rocks, which are almost completely wanting in soil. They inhabit regions where no rain falls for about three-fourths of the year. Most of them have in their tissue peculiar aggregates of cells which apparently serve for the storing up of water for the dry season. Succulent plants have been not inaptly compared to camels, "the ships of the desert", which provide themselves with a large quantity of water, and are then able to dispense with further supplies for a long time without injury.

Under cultivation it is not necessary to withhold water from these plants except perhaps for a few weeks in winter, and some successful growers of them do not keep them dry even for that time. For the greater portion of the year they may be watered regularly, provided they have at the same time as much sunlight as possible. They do not die if kept dry for a long period, but they are not benefited by it.

The tender species should be grown in houses or frames where they will receive little or no shade, even in very sunny weather. Many of them may be placed in the open air from June to the end of September: they all enjoy plenty of air. Their power to endure drought without suffering gives them a special value for gardens where daily attention cannot be well afforded. The most successful grower of these plants, however, is he who never allows them to shrivel or to be checked in growth for want of water, or to suffer in other ways. In a wild state the conditions during the short period when they can make new growth, and lay in a fresh store of moisture to enable them to withstand drought, are very different from anything we can provide. The rains are

accompanied by extreme warmth and very bright sunshine. Their leaf and stem structure is modified to enable them to bear these extreme conditions, and to make the most of them. The conditions we are able to supply artificially are less extreme, and the growth made by the plants is correspondingly slower. Generally it is best to keep them growing throughout the summer by supplying conditions favourable to growth, and to rest them in winter.

CACTI—These form a natural order of thirteen genera and something like a thousand species, all, with one or two exceptions, natives of the New World, though some are now naturalized in some parts of the Old. They are most abundant in Mexico and South America. They present considerable variety of form and stature, some becoming columns 50 feet high, whilst others are small cushion-like tufts. Many of them are attractive on account of the strange fantastic shape of their stems, their spines, and more especially their generally large handsome flowers, often richly coloured and deliciously fragrant. Those whose large flowers expand only at night are particularly interesting. As a rule the plants are easily kept in health, an ordinary greenhouse affording the right conditions for many of them. In damp, dull weather they are apt to lose their roots and even the base of the stem, but they strike root again readily if all the decayed parts are removed and they are then placed on dry soil to root. They also grow well when planted in a shallow bed of light loamy soil in a sunny frame or low house. The best position for them would be a rockery under glass facing south, and with sufficient hot-water pipes to ensure a temperature of 50° during cold weather.

Some species are sufficiently hardy to live permanently out-of-doors in the warmer parts of the British Isles. They require a sunny sheltered position, and should be planted in a mixture of brick-rubble and loam on a well-drained subsoil. A rockery against a south wall is an ideal position for

them, and if a few lights can be fixed over them, to keep off excessive moisture in winter, they are much safer.

A collection of hardy Cacti is grown at Kew in the recesses formed by the buttresses of the Palm-house. The border is raised by means of loam and pieces of sandstone, over which the plants form a thick interlacing growth. In severe weather a garden mat is thrown over them. So far as temperature is concerned, it is never so cold in any

phæniceus, *C. viridiflorus*, *Echinocactus glaucus*, *E. Pentlandi*, *E. Simpsoni*, *Mamillaria missouriensis*, *M. Nuttallii*, *M. Purpusi*, *M. Spæthiana*, *M. vivipara*, *Opuntia bicolor*, *O. Engelmanni*, *O. fragilis* (*brachyarthra* is a variety of this), *O. humilis*, *O. Picolomiana*, *O. polycantha* (*missouriensis*), *O. Rafinesquii*, *O. rhodantha*, *O. vulgaris*, *O. xanthostema*.

The following is a selection of the best-known Succulent Plants:—



Fig. 224.—Group of Mexican Cacti

part of England as in the haunts of these plants in the Rocky Mountains of Colorado, &c., where 40° to 50° of frost are not unusual, and at the time when the plants are bare of snow. Probably the alternations of cold and wet, frosty and muggy weather experienced in our climate often prove fatal to these plants. A sunny unheated frame, with detachable lights, would be the best of all situations for them.

The following are hardy:—*Cereus Engelmanni*, *C. Fendleri*, *C. gonacanthus*, *C.*

AGAVE (fig. 225).—An extensive genus, chiefly Mexican, containing many very ornamental species adapted for conservatory and outdoor decoration, and also for terraces. The old American Aloe (*A. americana*) and its varieties, *variegata* and *mediopicta*, are well known. They contrast well with, and retain their individuality in, the vicinity of masonry and statuary. All Agaves require to be kept moderately dry and safe from frost during winter. The best soil is loam, sand, and rotten manure. Large plants should be repotted in May.

Most of the species flower once and then perish. Under cultivation, however, especially in pots, they take many years to arrive at the flowering stage. A few flower almost annually. Some, such as *A. americana*, send up tall, pole-like spikes 20 to 30 feet high.

The best large sorts, with rosettes of leaves from 6 to 15 feet wide and 4 to 8 feet high, are: *A. americana*, *A. atrovirens*, *A. attenuata*, *A. Franzosinii*, *A. Hookeri*, *A. horrida*, *A. macracantha*, *A. miradorensis*, *A. Morrisii*, *A. potatorum*, *A. rigida*, and *A. striata*.

Medium-sized plants, of 2 to 4 feet spread, and 2 to 3 feet high: *A. applanata*, *A. dasylirioides*, *A. filifera*, *A. Ghiesbreghtii*, *A. hystrix*, *A. lurida*, *A. schidigera*, *A.*

Sisalana, and *A. Verschaffeltii*.

Small compact plants, of from 1 to 2 feet spread, and 1 to 2 feet high; dense-growing: *A. albicans*, *A. Beaucarnei*, *A. Bessereriana*, *A. geminiflora*, *A. mitis*, *A. Reesiana*, *A. Scolymus*, *A. striata*, *A. Victoriae reginae*, and *A. Wislizeni*.

ALOE.—African plants, some of the arborescent forms of which are ornamental both in leaf and flower. They should be grown in pots in sandy loam. *A. ciliaris* is a useful greenhouse climber. Most of the species have showy flowers, produced in autumn and winter. The old partridge-breast Aloe, *A. variegata* (fig. 226), is often seen better grown in a cottage window than in a conservatory, because in the former case it is kept for a



Fig. 225.—*Agave Salmiana* (the so-called Century Plant) in full flower at Kew

long time in the same pot, which Aloes appear to like. Some of the smaller species have prettily mottled or striped foliage, and their urn-shaped flowers, produced on slender, often branching, spikes, are always attractive.

The best for large houses are the following; they grow from 6 to 15 feet high, with a spread of foliage of 3 to 5 feet: *A. abyssinica*, *A. africana*, *A. arborescens*, *A. Bainesii*, *A. cæsia*, *A. ferox*, and *A. supralævis*. When they get too high the top can be cut off at whatever height may be chosen, and set in sandy soil, in which, if kept quite dry, it will soon root. This should be done in spring.

Medium-sized, height 2 to 5 feet: *A. albocincta*, *A. Cooperi*, *A. grandidentata*, *A. Greenii*, *A. lineata*, *A. Lynchii*, *A. mitræformis*, *A. saponaria*, *A. soccotrina*, *A. spinulosa*, *A. striata*, *A. tricolor*, and *A. vulgaris*.

Dwarf, height 6 to 20 inches: *A. humilis*, *A.*

prolifera, *A. Rebuti*, *A. serra*, *A. serrulata*, *A. somaliensis*, and *A. variegata*.

The following do very well in the open air in summer: *A. arborescens*, *A. fruticosa*, *A. serra*, and *A. vulgaris*.

CEREUS.—A large and important genus of Cacti, the species of which may be divided into three groups, namely, climbers, tall columnar stemmed, and short thick stemmed. The climbers produce the largest flowers, and generally require a stove to bring them to perfection. In large conservatories a group of the tall species has a good effect. The flowers nearly always open in the evening, and close the next day.

Climbers: *C. fulgidus*, *C. grandiflorus*, *C. Lemairii*, *C. MacDonaldiae*, *C. Napoleonis*, *C. nycticalus*, and *C. triangularis* (fig. 228).

Thin-stemmed or trailers; good for baskets: *C. Berlandieri*, *C. Blankii*, *C. flagelliformis* (fig. 227), *C. Mallisoni*, and *C. procumbens*.

Tall erect growers, 10 to 40 feet high: *C. geometrizans*, *C. giganteus*, *C. glaucus*, *C. Jamacaru*, *C. lividus*, *C. nobilis*, *C. peruvianus*, and *C. Sargentianus*.

Moderate erect growers, 3 to 10 feet high: *C. chilensis*, *C. eburneus*, *C. euphorbioides*, *C. gladius*, *C. multangularis*, *C. repandus*, and *C. strigosus*.

Dwarf species, less than a foot high: *C. cespitosus*, *C. dasyacanthus*, *C. emeacanthus*, *C. Leeanus*, *C. multiplex*, and *C. polyacanthus*.

COTYLEDON, including **ECHEVERIA**.—Crassulaceous plants from the Cape of Good Hope. They are used chiefly for bedding purposes. Some of them are worth growing in pots for the conservatory. The best of these are: *C. agavoides* (*Corderoyi*), *C. dasyphylla*, *C. gibbiflora*, *C. metallica*, *C. orbiculata*, *C. ovata*, *C. Pachyphyton*, *C. pulverulenta*, and *C. secunda*.

CRASSULA.—A few plants of this large genus are useful and ornamental for winter flowering



Fig. 226.—*Aloe variegata*

Fig. 227.—*Cereus flagelliformis*

in conservatories. They all grow very easily in a mixture of sandy loam and leaf-soil, and increase by cuttings freely. (Fig. 229.)

Large plants, free-flowering: *C. abyssinica*, *C. falcata*, *C. lactea*, and *C. pallida*.

Small or tufted species: *C. columnaris*, *C. Cooperi*, *C. hemisphaerica*, *C. impressa*, *C. perfoliata*, *C. pyramidalis*, and *C. Septas*.

ECHEVERIA.—See *Cotyledon*.

ECHINOCACTUS.—A large genus of Cacti, with short, usually thick stems, a few only growing to a height of over 3 feet. They rarely branch, but the stem is conspicuously furrowed and clothed with bundles of large, often hooked, rigid spines of forbidding aspect. Their large handsome flowers open only in bright sunshine. The majority require warm greenhouse treatment. They prefer a good loam soil mixed with sand and broken brick. They should be examined in spring, to see that the roots are good, as the plants may look healthy though the roots are dead. If rotten at the base, cut off the decayed part and expose the plant on a shelf until roots are emitted. Imported plants and cuttings should be treated in the same way. Some of the slow-growing sorts form plants quickest if

grafted on some free-growing *Cereus*, such as *C. peruvianus* or *C. tortuosus*. April and May are the best months for grafting.

The most interesting of the large kinds are the following: *E. cornigerus*, *E. cylindraceus*, *E. echidne*, *E. electracanthus*, *E. Emoryi*, *E. Pfeifferi*, *E. platyceras*, *E. Pottii*, *E. Visnaga*, and *E. Wislizeni*.

The following are of smaller growth: *E. bicolor*, *E. brevipalmatus*, *E. cinnabarinus*, *E. concinnus*, *E. corynodes*, *E. crispatus*, *E. Cumingii*, *E. denudatus*, *E. hexædrophorus*, *E. longipalmatus*, *E. Mirbelii*, *E. Monvillei*, *E. multiflorus*, *E. myriostigma*, *E. Scopa*, *E. Simpsoni* (said to be hardy in England), and *E. tortuosus*.

ECHINOCEREUS.—Included in *Cereus*.

ECHINOPSIS.—A genus of about twenty species, the stems of which are only a few inches high, and shaped like an Orange or a Pear, and their trumpet-like flowers are generally about 1 foot long, varying from white to deep-rose, very effective, and produced freely. The plants will stand rougher treatment than most Cacti, and are moderately hardy, growing well in the open ground in summer. They produce offsets freely, which should be removed early if large plants are desired.

E. cristata, *E. Decaisneana*, *E. Duvalii*, *E. Eyriesii*, *E. multiplex*, *E. oxygona*, *E. rosea*, *E. tubiflora*, *E. valida*, and *E. Zuccariniana*.

EPIPHYLLUM.—See "Popular Garden Plants".

EUPHORBIA.—A very large genus of extreme variation. Many of the African species, as well as those of other tropical countries, possess succulent, spiny, leafless stems like Cacti. They can, however, always be distinguished from Cacti by their milk-like juice, revealed by a slight pin-prick. *E. splendens*, with spiny rope-like stems, bears clusters of bright-red flowers, and *E. jacquinea flora*, with thin stems and willow-

Fig. 228.—*Cereus triangularis*

like leaves, is a valuable winter-flowering plant; the scarlet flowers are developed all along the stems. Very few of the other species have any distinctly ornamental character, but the most striking of those with succulent stems are grown along with Cacti. They require the same treatment as *Cereus*.

The best known are: *E. abyssinica*, *E. Beaumeriana*, *E. canariensis*, *E. Caput-Medusæ*, *E. cereiformis*, *E. Cooperi*, *E. globosa*, *E. grandicornis*, *E. Macowani*, *E. mamillaris*, *E. meloformis*, *E. polygona*, *E. resinifera*, *E. Sipolisii*, *E. tetragona*, and *E. virosa*.

FURCRAEA (*Forcroya*).—Agave-like plants, with

scald. They flower in spring or early summer. They require little water in winter.

Species with smooth foliage and a spiral habit of growth: *G. Bowieana*, *G. formosa*, *G. obliqua*, and *G. spiralis*.

Species with smooth foliage and a distichous habit of growth: *G. disticha*, *G. formosa*, *G. lingua*, and *G. nigricans*.

Species with rough foliage and a spiral habit of growth: *G. carinata*, *G. latepunctata*, *G. strigosa*, and *G. undata*.

Species with rough foliage and a distichous habit of growth: *G. brevifolia*, *G. intermedia*, and *G. verrucosa*.



Fig. 229.—A Group of *Crassulas* showing diversity in the genus

long, sword-shaped, usually spine-clad leaves, which are valuable as a source of fibre (Mauritius hemp, &c.). The green-leaved species are as ornamental as some Agaves, and *F. Lindenii* and *F. Watsoniana*, are attractively variegated. In habit and in flower-spike they closely resemble Agaves. They like warm greenhouse treatment, but may be placed in the open air along with Agaves in summer.

F. cubensis, *F. elegans*, *F. geminispina*, *F. gigantea*, *F. Lindenii*, *F. longæva*, *F. macrophylla*, *F. undulata*, and *F. Watsoniana*.

GASTERIA.—Dwarf Aloe-like plants, all natives of South Africa. They have rigid, usually trigonous, fleshy, unarmed leaves, mottled or covered with raised dots of grey. Their flowers are bright in colour, generally red, curved, and borne on long slender scapes, sometimes branched. They are charming plants for the greenhouse. If grown in bright sunshine the leaves are apt to

HAWORTHIA.—Dwarf Aloe-like South African plants, remarkable for the raised white pearl-like markings on the leaves of many of the species, which have obtained for them the name of Pearl Aloes. They require shade in summer and not to be over-dried in winter.

Species with smooth, foliage and fringed margins: *H. arachnoidea*, *H. Bolusii*, *H. setata*, and *H. translucens*.

Species with smooth, plain foliage: *H. cuspidata*, *H. parva*, *H. planifolia*, *H. retusa*, *H. tessellata*, and *H. turgida*.

Species with verrucose foliage with large warts: *H. erecta*, *H. margaritifera*, *H. papillosa*, and *H. subattenuata*.

Species with verrucose foliage with small warts: *H. attenuata*, *H. clariperla*, *H. fasciata*, and *H. radula*.

Species with stiff, spiral, green, cuspidate foliage: *H. bullata*, *H. congesta*, *H. foliolosa*,

H. pentagona, and *H. spiralis*. These are more rigid than the others, and grow 6 to 12 inches high. They are not unlike a branchlet of *Araucaria imbricata*. They are sometimes placed in a separate genus, namely, *Apicra*.

KALANCHOË.—Chiefly African plants, related to *Crassula*. They are erect herbaceous shrubs with very fleshy decussate foliage, and some of them bear large corymbose heads of bright-coloured flowers. They may be grown in a greenhouse or frame if allowed plenty of sun-

MAMMILLARIA.—A large genus of dwarf Cacti, depending on the various colours of the spines and the geometrical arrangement of the mammi for their chief attractions. They all grow freely in a greenhouse, and require free watering in summer, with occasional syringing overhead to keep down insects. They live through the winter without water. Their flowers, which are small and usually red, are developed in a zone a little below the apex of the stem, and are usually succeeded by red berry-like fruits.



Fig. 230.—Euphorbias

1, globosa; 2, cereiformis; 3, Macowani; 4, Caput-Medusæ; 5, meloformis; 6, tetragona; 7, polygona; 8, Beaumeriana; 9, Sipolisii; 10, Cooperi.

light. The best species, *K. flammea* (scarlet), from Somaliland, requires a tropical temperature until it has made its growth, when it should be removed for a few weeks into a greenhouse, and be kept dry. It flowers in early summer and lasts at least two months.

Other species in gardens are: *K. Bentii* (white), *K. carnea* (pink), *K. grandiflora* (yellow), *K. marmorata* (marbled leaves), and *K. thyrsiflora*.

KLEINIA.—A Senecio-like genus, with fleshy leaves and yellow flowers. They are grown chiefly as bedding plants, some of them having grey or silvery leaves of ornamental character. They flourish with the same treatment as *Crassula*.

K. articulata, *K. calamifolia*, *K. repens*, *K. spinulifera*, and *K. tomentosa*.

Stems 4 to 12 inches high, white spines: *M. angularis*, *M. bicolor*, *M. cirrhifera*, *M. nivea*, *M. nobilis*, *M. Parkinsoni*, *M. Peacockii*, *M. senilis*.

Stems branching, 1 to 5 inches high, spines white: *M. gracilis*, *M. polia*, *M. Schiedeana*, *M. stellaris*.

Stems dense, erect, 4 to 18 inches high, spines yellow: *M. erecta*, *M. Odieriana*, *M. Pfeifferi*, *M. rhodantha*, *M. Schlectendalii*, *M. spinosissima*.

Stems branching, 1 to 4 inches high, spines yellow: *M. densa*, *M. echinata*, *M. stella-aurata*, *M. Wildiana*.

Stems erect, 6 to 20 inches high, spines red: *M. caracasana*, *M. elegans*, *M. rhodacantha*, *M. Schelhasii*, *M. verruculata*.

Stems erect, 4 to 12 inches high, dark spines:

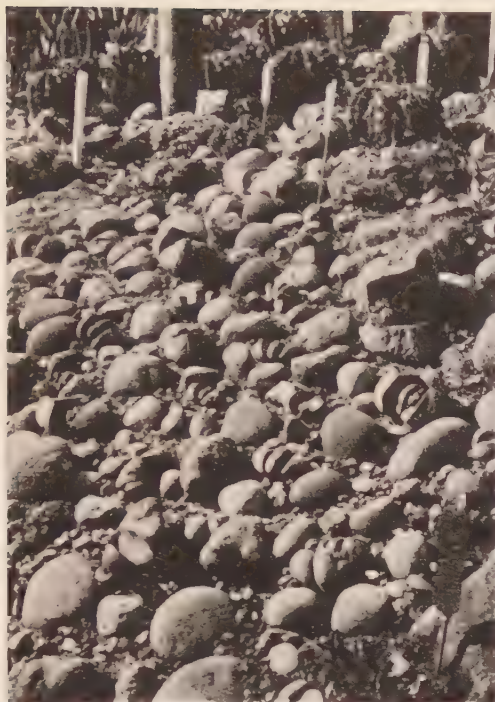


Fig. 231.—*Mesembryanthemum Bolusi*

M. coronaria, *M. kewensis*, *M. melaleuca*, *M. phymatothele*, *M. tetraacantha*, *M. variabilis*, *M. vetula*.

Mammie large, flowers yellow, spines brown: *M. elephantidens*, *M. gigantothele*, *M. longimamma*, *M. pycnacantha*, *M. sulcolonata*, *M. Winklerii*.

MESEMBRYANTHEMUM.—An extensive and very varied genus of Cape plants, within whose limits there are plants for the florist, for the amateur who loves plants for structural beauty or singularity, and for those who desire only useful bedding plants. With the exception of the dwarf, fat-leaved sorts, they all root freely in a mixture of loam and leaf-mould with a dash of sand. The flowering kinds should be kept only two or three years, as the old plants do not grow or flower so freely as younger ones. Cuttings should be put in about May. The plants, if dry, will stand a few degrees of frost.

The best species for the sunny greenhouse, vases, or window-boxes are: *M. barbatum*, *M. blandum*, *M. Brownii*, *M. candens*, *M. conspicuum*, *M. curviflorum*, *M. emarginale*, *M. falcatum*, *M. formosum*, *M. glaucum*, *M. imbricans*, *M. polyanthum*, *M. reflexum*, *M. retroflexum*, *M. roseum*, *M. spectabile*. These can be used for bedding purposes very well; those that require it can be pegged down.

Fleshy-leaved species, which have a fascination for the lover of uncommon types of vegetation: *M. agnimum*, *M. albidum*, *M. Bolusi* (fig. 231), *M. densum*, *M. dolabriforme*, *M. Elishæ*, *M. felinum*, *M. fissum*, *M. fulviceps*, *M. Lesliei*, *M. linguæforme*, *M. minimum*, *M. murinum*, *M. nobile*, *M. obconellum*, *M. octophyllum*, *M. testiculare*, *M. tigrinum*, and *M. vulpinum*. These are dwarf growers, and require more sand and some

brick rubbish in the soil, with less moisture.

OPUNTIA.—The Prickly Pear or Indian Fig genus, characterized by broad, flattened stems, suggestive of battledores. The species vary in size and habit, some being tree-like, with woody stems, whilst others trail on the ground. A few have cylindrical stems. Many are clothed with long barbed spines, and are used as fences in tropical countries. Their flowers are usually tawny-yellow. The fruit of some are edible. The vitality of the stems is exceptional, small pieces rooting quickly and soon forming large plants. A few well-marked kinds have a pleasing effect among plants of ordinary appearance. The best are: *O. basilaris*, *O. clavarioides*, *O. corrugata*, *O. decumana*, *O. elatior*, *O. Engelmanni*, *O. exuvata*, *O. Ficus indica*, *O. horrida*, *O. maxima*, *O. microdasys*, *O. monacantha*, and *O. senilis*.

PHYLOCACTUS.—See under POPULAR GARDEN PLANTS.

PILOCEREUS.—The old man Cactus, *P. senilis*, has long hairs produced freely from the apex of the stem, and is very striking. It does not grow so fast as *Cereus*, and seldom flowers. It is a curious fact that no insects infest this plant. It requires little water. Other species are: *P. fossilatus*, *P. glaucescens*, *P. Hoppenstedtii*, and *P. jubatus*.

RHIPHALIS.—A tropical genus of Cacti. Some have leafless whip-like branches which bear white berries suggesting Mistletoe, others have flattened branches as in *Epiphyllum*; a few of the latter are worth growing for their flowers. They grow as epiphytes in the forests of Brazil and the West Indies, and are interesting to those who like curious plants. *R. Cassytha*, *R. funalis*, *R. Houlletianus*, *R. mesembryanthoides*, *R. pachyptera*, *R. Saglionis*, and *R. salicornoides*.

ROCHEA.—Greenhouse plants related to *Crasula*. The best known, and one of the most



Fig. 232.—*Opuntia tunicata*

Fig. 233.—*Sempervivums*

1, *cucare*; 2, *holochrysum*; 3, *canariense*; 4, *arboreum*; 5, *urbicum*.

Fig. 234.—*Stapelia Desmetiana*

decorative of the whole order, is *R. coccinea* (also known as *Crassula* and *Kalosanthus*), which has erect stems clothed with sheathing decussate leaves, and bearing in summer large corymbose heads of scarlet flowers. This and *R. jasminea* have been crossed, and their progeny are pretty free-flowering plants of varying colour from white to rose-red. They strike freely from leaves or cuttings put in in spring. *R. coccinea*, *R. jasminea*, *R. versicolor*. (The plant sometimes called *R. falcata* is a *Crassula*.)

SEMPERVIVUM.—The Canary Island species of this large family are easily grown in a greenhouse in any soil. They form tall handsome plants and produce large pyramidal spikes of yellow or grey-white flowers. They are also good plants for sub-tropical bedding, and are easily propagated either by seed or cuttings.

Large growers, spreading from 10 to 20 inches: *S. arboreum*, *S. aureum*, *S. canariense*, *S. cucare*, *S. cuneatum*, *S. dorame*, *S. holochrysum*, *S. urbicum*, *S. velutimum*. (Fig. 233.)

Dwarf growers, spreading from 4 to 10 inches: *S. aureum*, *S. balsamiferum*, *S. Haworthii*, *S. paviæ*, and *S. tabulaeforme*.

STAPELIA.—Toad-flower, or Carrion plant. A large genus of great interest on account of the structure of the flowers and peculiarities of growth. The plants grow freely on an exposed shelf, requiring but little water in winter, but to be freely supplied when growing in summer. Attracted by their odour, flies deposit their ova on the flowers, mistaking them for putrid flesh.

The best-known species are: *S. Bayfieldii*, *S. Bufonia*, *S. campulata*, *S. Desmetiana* (fig. 234), *S. europæa*, *S. gigantea*, *S. glauca*, *S. hirsuta*, *S. maculosa*, *S. patula*, *S. planiflora*, *S. Plantii*, *S. radiata*, *S. Thuretii*, *S. variabilis*, *S. variegata*.

FORCING AND RETARDING

HARDY SHRUBS FOR FORCING

Large numbers of hardy shrubs are now grown solely for forcing, either for the supply of cut flowers or to be used as plants in flower for furnishing conservatories, or for the decoration of halls and large rooms. The gorgeous flowers of the Tree Pæonies; Lilac, in variety of colour, and always fragrant; Roses, doubly valuable in early spring, when their flowers are so delicate in colour and in perfume; the double Peach; Pyrus and Thorn; Rhododendrons, both evergreen and deciduous, fill conservatory or room with interest and beauty during winter's dull days.

Though shrubs for forcing can be purchased at a reasonable rate, it is more economical to set aside a piece of ground for their culture, and work up a supply of plants at home. In this way healthy young plants would be at hand to replace exhausted ones, which could be rejuvenated by giving them a rest of a year or two in the nursery. In addition to ground for purposes of planting, a plunging-ground is essential, for although some shrubs require planting-out every other year, there are others that must always be grown in pots.

To obtain good, well-ripened wood, the ground selected for the nursery should be exposed to full sun. For the majority a rich medium loam will be found most suitable, adding peat and leaf-mould for Ericaceous plants. It is preferable to raise plants from cuttings, seeds, or grafts, and grow them for two years without flowering. This time should be spent in laying a good foundation for the future plant; consequently all weak, useless wood should be removed, so that the whole strength may go to permanent parts, and the maximum amount of sun and air be admitted to the whole. At three years of age most shrubs are in first-rate condition for forcing. Those grown in borders should be lifted in October, potted, and plunged in ashes or light soil until required for use.

If the cultivator has ample means at his disposal, such shrubs as Lilac, Staphylea, and a few Rhododendrons may be had in

flower at Christmas, if given special treatment during summer and while being forced. February, March, and April are the three months at which the forced shrubs generally are at their best, and for this they do not require excessive heat. As a rule it is better to place shrubs in a temperature not exceeding 50° for the first fortnight, afterwards raising it to 60° or more with sun-heat as the buds begin to swell. Much greater heat than this can be used, but it is better to take a week or two longer with a lower temperature than to use great heat. The plants are then not so much exhausted; they also develop healthy foliage with the flowers, which is better than when leaves are absent. A moist atmosphere must be kept in the forcing-house, and the plants be well syringed several times daily. As flowers begin to open, the plants should be removed to a cool house. To get plants into flower for the earlier dates from four to six weeks are required; for March and April from two to four weeks.

After the flowers are over the plants must be pruned, cutting out all weak, worthless, and old flowering wood to encourage strong new growth. Throughout the summer weak, useless shoots should be removed. Plants that have been forced should be placed in a cool house until all danger of frost is gone, kept growing, and given abundance of air. Towards the middle of May those that require a year's rest should be planted in the nursery, others that may be used for another season being plunged and well fed until growth is completed.

SUITABLE PLANTS

ACER.—The suitable plants are confined principally to three species—*A. japonicum*, *A. palmatum*, and *A. Negundo*. The great variations in form and colour of the dainty foliage of *A. palmatum* is rarely if ever equalled in any one species. *A. japonicum* has also a large number of fine-leaved forms showing great diversity of character. *A. Negundo variegata* is bright-green and milk-white when forced. All may be grown in pots, and successfully forced for a number of years in succession. Feeding is necessary when growth is active.

AMELANCHIER canadensis oblongifolia.—Dwarf and shrubby; flowers white, in great profusion. It may be flowered early in February, and forced two successive years, after which it should have a year in the nursery. Very little pruning is needed.

CEANOTHUS.—Several are valuable for their bright-blue flowers. They require to be grown in pots in rich soil and pruned hard after flowering. The protection of a cold house or frame should be given on the approach of winter. *C. divaricatus* is of thick bushy habit; *C. papillosus*, pale-blue; *C. rigidus*, 7 feet high, previous year's wood thickly clothed with deep-blue flowers; *C. Veitchianus* has a good constitution, is most floriferous, and the flowers are dark-blue.

CHIMONANTHUS fragrans grandiflora.—Although its yellow blossoms may often be gathered from walls in January in mild weather, their fragrance and beauty are always acceptable in the conservatory.

CHIONANTHUS virginica (the Fringe Tree) has loose drooping panicles of pure-white flowers by Easter if not forced too hard.

CHOISYA ternata may be had in flower at Christmas, when its bright glossy leaves and numerous fragrant white flowers are serviceable.

CLEMATIS.—A selection of the best garden varieties should be grown in pots, to flower from the middle of February onwards for several months. One-year-old plants twisted round sticks, and placed in an intermediate temperature in January, will produce from twelve to twenty flowers each in six weeks' time, every flower 3 inches across.

CORYLOPSIS.—The catkin-like inflorescences of *C. pauciflora*, primrose-yellow, and *C. spicata*, yellow with conspicuous red anthers, may be had in February. Both are twiggy bushes which require no other pruning than an occasional thinning.

CRATÆGUS.—Red and white Hawthorns, double and single, are easily forced, and make charming decorative plants. Though it is possible to force specimens of considerable dimensions, the neatest and most suitable are those grown as bushes from 3 to 4 feet high. During summer the shoots must be pinched back to form spurs from which the flowers are produced. They may be flowered in the same pots for several years, but require an occasional rest in the nursery. All useless shoots should be removed to prevent the plant from becoming too dense.

CYTISUS.—Favourites for forcing. If bush plants are required they should always be on their own roots; standard specimens are worked on the Laburnum, but they require frequent renewal. After flowering they must be cut hard back, or they soon get leggy. The most useful are: *C. albus*, *C. biflorus*, pale-yellow; *C. kewensis*, creamy-white; *C. purpureus*, purple; *C. scoparius*, var. *Andreanus*, golden-yellow and maroon.

DAPHNE.—The fragrant flowers of several species may be had in December, January, and February with little forcing. Alternate years in the nursery is necessary. *D. Cneorum* has heads 1 inch across of small red flowers on every shoot; *D. Dauphini* has fragrant white flowers, shaded purple; *D. Mezereum* has flowers either deep-red, pink, or white, and is sweetly scented.

DEUTZIA.—Excellent forcers. If subjected to excessive heat they require a rest every alternate year; moderately forced they last three successive

years. *D. corymbiflora*, flowers in large corymbs; *D. crenata*, flowers in racemes 6 inches long; *D. gracilis*, most floriferous, and very useful either as plants or for cutting; *D. Lemoinei* (*gracilis* × *parviflora*) is as free as *D. gracilis*, with the large upright panicles of *D. parviflora*—preferred by some to *D. gracilis* for forcing.

DIERVILLA.—Several of these, such as the forms of *florida* and *hortensis*, are worth a place among shrubs that are lifted from the open ground annually and given a little warmth under glass for spring flowering.

ERICA.—Several hardy species force well. They



Fig. 235.—*Hibiscus syriacus*

should be potted up in September, and plunged in a cold frame until December, when they may be removed to the greenhouse. The flowers last two to three months. The best are: *E. australis*, rosy-purple; *E. carnea* and its white variety; *E. lusitanica*, tall, white; and *E. mediterranea hybrida*, very free, 6 to 9 inches high.

FORSYTHIA suspensa and *F. intermedia*, var. *specabilis* are very free, and force well if placed in a greenhouse, lasting for weeks. They should be hard pruned after flowering.

HAMAMELIS.—The Japanese Witch Hazels are good forcers if not rushed. The best is *H. mollis*.

HIBISCUS syriacus (fig. 235) in its numerous single and double forms, may be successfully forced in a medium temperature.

HYDRANGEA Hortensia and *H. paniculata* var. *grandiflora* are largely grown. The correct method of culture for the former is to put in cuttings in early autumn of strong half-ripe points. When rooted they are exposed to full sun and thoroughly ripened. During early winter they must be kept dry and cool. In January replot them into 5-inch pots, and place them in heat as

required. There are also crosses and seedling forms of *H. hortensia* which are grown for forcing. *H. Mariesii* has extra large, rose-coloured, sterile flowers and blue fertile ones. Strong plants in pots should be pruned to within three eyes of the base and stood in an intermediate temperature. In three weeks they may be given the temperature of a stove. The weakest new shoots should be removed, leaving one only to each branch. They should be well syringed and fed until the flowers open. Although they may be forced in strong heat, more satisfactory results are obtained by cooler treatment, heads of flowers 1 foot across being thus obtained. They may be rested in alternate years. The flowers

"the Yulan", and the several hybrids between it and *M. obovata*, particularly *M. Soulangiana* and *M. Alexandrina*. The purple-flowered *M. obovata* and the pure-white *M. stellata* are excellent when forced. The flowers of the latter are glistening white, star-like, and so abundantly produced that they completely hide the plant.

OLEARIA stellulata and several others have pretty star-shaped white flowers, and if kept in pots and not subjected to excessive heat may be used several years in succession.

PÆONIA Moutan (the Tree Pæony) is an excellent plant for forcing if grown in pots and well established before being subjected to heat. There are many varieties with flowers from



Fig. 236.—*Philadelphus Dame Blanche* (forced)

may be changed to a blue colour by mixing "Cyanol" with the soil.

HYPERICUM Moserianum and *H. patulum* are useful when not overforced in strong heat and if started not earlier than March.

KALMIA angustifolia, rose: *K. glauca*, rosy-purple, and *K. latifolia*, pinkish-white, force nicely if brought on gently, to flower in April. They should be well established in pots.

KERRIA japonica is an easily managed shrub, bearing orange-yellow flowers in February if started in January; the double variety lasts longer than the single. May be grown and forced in the same pots with liberal feeding three years in succession. All old flowering wood should be removed as soon as the flowers are over. After the third year it is better to throw the plants away and begin again with young ones.

LABURNUM is a charming plant when forced for the conservatory. The plants should be potted in spring to force the following year.

LAURUSTINUS. See *Viburnum Tinus*.

MAGNOLIA.—Plants lifted from the open ground with care and planted in pots may be had in flower in early spring. The best forcers are *M. conspicua*,

4 to 9 inches or more across, their colour varying from white to pink, crimson, and deep-purple. They stand fairly hard forcing, and may be had in flower early in February.

PHILADELPHUS.—The fragrant white flowers of the various Mock Oranges make them very acceptable. They should not be forced very hard. *Virginale* and *Dame Blanche* (fig. 236) are two of the best forcers.

PIERIS floribunda, a dwarf, compact evergreen, with upright panicles of white flowers from every growth, and *P. japonica*, with large pendulous clusters of pure-white blossoms, also an evergreen, may be got into flower in February with a month's easy forcing.

PRUNUS.—Some of the most beautiful, useful, and easily managed plants for forcing belong to this genus. They may be had in flower from January until they bloom outside. The double-flowered forms are most in demand, though the single ones are beautiful. The plants may either be potted up from the open border in October or be grown in pots in the same manner as fruit trees for forcing, and may be used a number of years in succession provided they are not exhausted by excessive heat. After flowering they

should be pruned hard and fed liberally to induce strong growth, placing them in full sun to thoroughly ripen the wood. Some of the best are: *P. Pissardi*, purple leaves with white flowers; *P. Rhexii*, a double white-flowered Cherry, flowers very freely and forces well in an intermediate temperature; *P. japonica*, double white, 4 feet high, may be forced into flower soon after Christmas; *P. nana*, dwarf, with Almond-like flowers; *P. persica*, varieties with double flowers, ranging from white to deep-red; *P. Pseudo-Cerasus*, semi-double forms recently introduced from Japan, with flowers 2 inches across. *P. Watereri* has very large pinkish-white flowers. *P. serrulata*, double white, large; *P. triloba*, double, rose-coloured, on shoots 2 to 3 feet long.

PYRUS.—The following may be forced successfully: *P. floribunda* and its forms, white or rose; *P. spectabilis*, semi-double; they should be grown as bushes on a dwarfing stock.

RHODODENDRON, including the Mollis and Ghent Azaleas.—Large or small plants can be used. It is advisable to plant them out after flowering, and rest them for a year, although some will do fairly well two years in succession. Weak inside shoots should be cut out.

For December and January the best are: *R. Nobleanum*, bright-red, white if forced hard, can be had in flower at Christmas; *R. flavum* (*Azalea pontica*), yellow, sweetly scented; *R. præcox*, rosy-purple; *Rosa Mundi*, Rosy Bell, dwarf, with drooping, white, rose-tinted flowers.

For February and March the best are: *Alice*; *caucasicum album*, white; *Everestianum*, rosy-lilac; *fastuosum flore pleno*, lilac; Grand Arab, red; John Waterer, red; *limbatum*, white, margined crimson; Loder's White, Mrs. John Clutton, white; Pink Pearl; Prince Camille de Rohan, red; Sappho, white, black spots; Vesuvius, red; Boule de Neige, Cynthia, and John Walter.

The *mollis* section furnishes many excellent sorts for early forcing, and bears a high temperature well. The flowers show variety of colour, from yellow to brick-red.

R. Kaempferi is used for forcing with great success, lasting in flower for a long time. The freer-growing forms are excellent for cutting, keeping fresh for over a week.

RIBES.—The most serviceable are *R. aureum*, with fragrant yellow flowers, and *R. sanguineum*, var. *atrosanguineum*, red; both easily forced.

ROBINIA hispida has pretty drooping racemes of rose-coloured flowers, which may be forced early into bloom if established in pots and not put into much heat.

ROSES.—Many of the varieties of Rose may be successfully forced, but they require some preparation if good specimens and fine flowers are wanted. A Rose should be three years old before it is forced; after that, if properly treated, it will last for years. The plants should be on their own roots, as if grafted on the Manetti or other stock they produce suckers freely when forced. Cuttings of half-ripened wood, taken with a heel and inserted in 5-inch pots filled with turfy loam and leaf-mould, plunged in bottom-heat, soon root. A frame placed on a dung bed, with 6 inches of coco-fibre refuse in which to plunge the pots, is a suitable place for them, if plenty of air is given daily, and as soon as they are established, the lights taken off altogether. They may be wintered in a cold frame and protected from frost. Cut them back to two eyes in January, and give no water until they begin to grow, when they should

be repotted, and if the weather is favourable, plunged on the open border, giving plenty of water. All flower-buds should be picked off. In the autumn they must be again protected in a cold pit or house, pruned in January, shortening the strong shoots to three or four eyes, and plunging them out again in the open ground.

About midsummer they should be repotted in good turfy loam and cow-dung, with a little powdered brick rubbish or charcoal to keep the soil open, adding some good leaf-mould for the delicate tea-scented sorts, and again placing them in the open air; they will not require potting again until after they have flowered.

The plants should be pruned according to the



Fig. 237.—Lilac (Marie Legray)

time at which they are required to be in bloom. For instance, plants required to bloom at Christmas should be pruned not later than the first week in October; and they must be brought very gradually on, allowing three months for them to make their growth and flower. They require to be frequently fumigated to destroy aphides, and the maggot must be diligently sought for and killed.

SPIRÆA.—Some species may be forced in an intermediate temperature to flower in February; by attention to pruning and feeding they may be used two or three successive years. The best are: *S. arguta*, *S. media*, *S. prunifolia flore pleno*, *S. Thunbergii*, and *S. Van Houttei*.

STAPHYLEA colchica is one of the best shrubs for forcing, as it produces large panicles of pure-white flowers from Christmas onwards. The plants should be rested on alternate years.

SYRINGA (Lilac) (fig. 237).—Large quantities of forced Lilac bloom may be seen in the florists' shops in winter; it is obtained from plants prepared as follows: The best varieties are grafted on stocks of the common Lilac, the scion being

inserted 6 inches from the base. They are allowed to grow for two seasons, strong shoots only being allowed to remain. At the end of the second year they have from eight to twelve strong growths each. At the end of July or beginning of August, before they are required for use in the winter, each plant is root-pruned, so that it will go into a 7 or 8-inch pot. This root-pruning is also a great aid to ripening. The holes made by the spade are not filled in, the object being to allow both sun and air to get to the roots. In September they are potted and plunged until wanted. When required for Christmas, they are put into a dark house having a temperature of 70° to 85°, and kept well syringed; the heat and darkness blanches any coloured varieties. When required in spring, less heat is given, though a high temperature is often employed to get flowers quickly.

After flowering, the plants are cut back to two or three eyes and stood in a cool house to break. When all danger of frost is gone, they are planted in the open border to grow for at least a year. Those which have been subjected to great heat require two years. During this treatment all weak wood and suckers are pruned away, a few strong shoots only being allowed to remain. By growing them on, large plants may be obtained carrying

thirty or forty heads of flowers each. Small plants bearing four or five heads of flowers are sometimes grown in 5-inch pots by grafting the Lilacs on Privet. The varieties used are Charles X, Marie Legray, Rubra de Marly, Souv. de L. Spath, President Grévy, Madame Lemoine, and Alphonse Lavallee.

S. persica, the Persian Lilac, may be forced in an intermediate temperature, and may be used two years in succession.

VIBURNUM Opulus (the Snowball Tree) is easily forced, but if great heat be used the flower-stalks are weak and easily broken. *V. Carlesii* is very fragrant and forces well; *V. macrocephalum* has immense heads of flowers; *V. Timus*, the *Laurustinus*, may be had in flower from Christmas onwards. *V. tomentosum plicatum* has dense heads of pure-white flowers, and is one of the best. All should be rested alternate years.

WISTARIA chinensis is particularly pleasing when forced early, but it should not be given too much heat, or the flower-buds are apt to drop off. Plants for the purpose should be established in pots two years before they are forced.

ZENOBIA speciosa and its variety *pulverulenta* produce waxy-white flowers freely, and are valuable in the greenhouse in late spring.

HERBACEOUS PLANTS AND BULBS FOR FORCING

The preparation of bulbs and herbaceous plants for forcing is similar to that already described for shrubs. They must be treated in such a manner as to induce early growth and ripening in good time before they are forced. This is especially the case with such plants as Carnations, Marguerites, and Mignonette, the early preparation of which, rather than excessive forcing, ensures a good supply of bloom during the winter and early spring. Deciduous herbs and bulbous plants also, if planted early, ripen earlier in the autumn, and make the best material for growing in pots. If not thoroughly ripened before being restarted they will probably prove a failure. Many plants may be placed in a shady or even a dark position in a greenhouse, and, when growth begins, removed to where they will receive all the sun and light possible.

VARIETIES

ALLIUM neapolitanum.—This is extensively grown for market, the large terminal clusters of white flowers being very useful. It requires little skill. Early potted bulbs may be started in an intermediate temperature, and will require little forcing to have them in flower early in the year.

CHIONODOXA Lucillæ.—This may be grown in pots for winter flowering, a sunny position in a cool greenhouse suiting it well. The clear-blue flowers are very effective.

CHRISTMAS ROSE (*Helleborus niger*).—The

variety known as *maximus* is the best for forcing. The clumps should be potted as they are taken from the ground. If the weather is mild the protection of a frame will be sufficient until the flowers begin to throw up, when they may be removed to a warm house, shaded, and liberally supplied with water. There are few flowers more



Fig. 238.—*Dicelytra spectabilis*

valued at Christmas-time. It is sometimes difficult to get good stock for forcing. Those that have been used for indoors should have attention after they have done flowering, and if divided up carefully, taking care not to damage the points of the roots, and planted in deep loamy ground, they will make good stock; the crowns must be kept well below the surface when planting.

CROCUS.—Select strong bulbs and pot as early as possible. Any ordinary potting compost may be used. They may be placed outside, and covered with fibre refuse or cinders until they are rooted through, when they may be given a little heat to start them. Liquid manure gives strength and colour to the flowers.

DIELYTRA.—Plants intended for forcing should be taken up in the autumn, potted, and kept in a cold frame until required for starting. The first batch may be put into warmth in January, under a stage in an intermediate house being a suitable place. A covering of fibre refuse will serve to keep them moist and dark. When the growths show through the fibre the plants may be moved to a light, sunny position. If started too early, or in too high a temperature, leaves are developed instead of flowers. When the plants are in active growth manure water may be used freely. A light, airy position is essential.

FRITILLARIA.—When well established in pots these may be started early in the year in an intermediate temperature and a light, sunny position; manure may be used freely after they are well started into growth. They must not be allowed to get quite dry, and over-watering must also be avoided. *F. imperialis* (Crown



Fig. 240.—A Bowl of Hyacinths (forced)

Imperial) and *F. meleagris* (Snake's Head or Plover's Eggs) (fig. 239) are the two used.

FUNKIA.—Several of these, if established a season in pots, may be started in warmth and make fine pot plants, the foliage alone being very effective. They should be potted in strong loam and kept in a frame, not allowing them to get dry. *F. Sieboldi*, and the variety *variegata*, *F. grandiflora*, and *F. undulata* may be recommended. The variegated forms are prettier forced than when grown out-of-doors, and their leaves are extensively used during the spring by the London florists.

GLADIOLUS.—The *trimucalata-hirsuta* section is particularly useful for early forcing. Early in the autumn the bulbs should be potted in a good loamy compost, planting several together in a 6-inch pot. They may be placed in a cool pit, or in any position where frost cannot reach them. When growth is visible above the soil they may be removed to a warmer position to flower quite early in the year. The sorts that force well are *Colvillei alba*, *Blushing Bride*, *Brenchleyensis*, and *Gandavensis*.

HYACINTH.—For early forcing a great deal depends upon securing firm, well-matured bulbs. The treatment cannot increase the number of flowers, but their size and the strength of the spikes may be improved by good culture. They should be treated as already advised until required for forcing. If the roots are not then well through they should only have a moderately warm position for a time, and an inverted pot may be placed over those not well advanced in growth. As soon as the leaves open and leave the spikes free they should have all the light possible and be liberally supplied with liquid manure.

IRIS.—The varieties of English, Dutch, and



Fig. 239.—*Fritillaria meleagris*

Spanish may be forced for early flowers, and they provide a number of bright tints in colours which are much appreciated. Potted in good loam, leaf-mould, and manure, and placed in a cool, shady position in a frame, they soon respond to a little extra warmth, and may be had in flower some weeks earlier than those in the open ground by giving them an ordinary greenhouse temperature.

LILIUM.—The most useful for forcing are *L. auratum*, *L. regale*, *L. sutchuenense*, *L. longiflorum*, *L. candidum*, and *L. speciosum*. The bulbs should be potted as early as possible after they are ripe in good yellow loam, leaf-mould, and manure, planting them rather low in the pots, so as to allow space for top-dressing later. With plenty of light and air they may be hastened on with heat, but in dull, dark weather heat will only make the flower-stems weak and lanky.

LILY OF THE VALLEY.—German crowns are preferable to either Dutch or English, the flowers being larger and opening all at one time. The single crowns may be potted twelve to twenty-four in a 4-inch or 6-inch pot, or they may be planted in small boxes and covered with fibre refuse or other similar material, which should remain until they are well started. For early forcing a close pit with plenty of bottom-heat is desirable, plunging the pots in moist material, keeping them close and dark until the flowers begin to open, when they may be gradually exposed to light, but not to bright sunlight. If moved into a rather cooler position for a few days before cutting they will last longer.

MIGNONETTE.—To obtain plants to flower in winter and early spring, seeds should be sown early in August in pots filled firmly with a compost of loam, rotted manure, and lime rubbish,



Fig. 242.—*Narcissus poeticus* (forced)



Fig. 241.—Lily of the Valley (*Convallaria majalis*)

and placed in a sunny frame or on a shelf in a greenhouse. Short, sturdy growth, well advanced before November, should be aimed at. With light and air a little artificial heat may be given, but in dull weather the cooler the treatment the better, or the flower-spikes instead of advancing will go blind, and leafy side-shoots will start from the base. Liquid manure may be given when the plants are about an inch high, unless the growth is too gross, when it should be withheld until the flowers begin to open. Some growers sow earlier and grow the plants singly in pots, pegging the stem down so as to secure a number of lateral shoots. Plants so treated keep dwarf, and generally flower well.

NARCISSUS.—The majority of the varieties may be forced, to be used as pot plants from Christmas onwards, or even earlier, the Paper White, early Roman, and others of the Polyanthus section, if started early in the autumn, coming into bloom early in December. Emperor, King Alfred, and *N. poeticus* (fig. 242) are excellent forcers. Bulbs intended for forcing should be potted in September in a compost of loam, leaf-mould, and cow-dung, and placed where they can be protected from frost, covering them with fibre refuse or other light material. When taken indoors they may be started under a stage and removed to a lighter position as soon as the buds show. They will not bear much heat, the buds being apt to go blind if hurried. The common double Daffodil is one of the best for an early display.

SNOWDROP.—Grown in pots these only require

the protection of a frame to have them in flower at Christmas; or if there is severe weather they may be put where there is sufficient warmth to keep out frost; or they may be brought on earlier by placing them on a shelf in a warm greenhouse.

SOLOMON'S SEAL.—The strongest crowns should be selected, and about six potted together in 6-inch pots. They will start vigorously if placed in a cool house in a shady position, and kept moist by covering them with ashes or fibre until they have made a good start. They go well with *Dielytra*, and may be treated in a similar manner. The dwarf form may be grown in 5-inch pots.

SPIRÆA (*Hoteia*).—Imported roots are preferred for early forcing. They are potted up as soon as received, and placed in a cool place, giving more warmth after they have made new roots. The crowns should be covered and kept quite moist, but not too wet, or the roots will rot. After they have started they should have a light position in an intermediate temperature, too much heat causing the flowers to develop too early and weak. *S. palmata* should not be started until early in February. It forces badly if placed in a higher temperature than that of an ordinary greenhouse. In addition to the common *S. japonica* and *S. palmata* there are several of recent introduction, viz. *astilboides floribunda*, *compacta*, and hybrids of these.

TUBEROSE.—The time of flowering may be

regulated by potting some of the bulbs as soon as received and keeping the others dry and cool, to be potted later. All growths except the central crown should be removed as they show. The Tuberose requires more heat than many plants that are forced; a little manure, if given after the flower-spikes are well advanced, will ensure well-developed blooms. Bulbs potted late for flowering in autumn and winter may be placed out-of-doors, but when the flower-stems push up they should be taken indoors. They may be kept back to flower at Christmas by keeping them cool and dry until about six weeks before they are wanted, but the flowers will not develop well if kept too cold after they begin to show. Aphides, if not kept off, will spoil the flowers; tobacco fumigation when the flower-stems are well advanced will prevent this.

TULIPS.—These are particularly appreciated early in the year. The bulbs should be potted early as advised for Hyacinths, and treated in the same way. For early forcing they may be started as soon as the roots are well round the pots. For cut flowers they may be grown entirely in the shade, but for pot plants they should be given more light, or they get tall and weak. Heat may be given as circumstances require; those grown in a high temperature come on quickly, but the flowers will not be so large as those brought on more gradually. Liquid manure may be given freely, and will increase the size of the blooms.

RETARDING PLANTS

In addition to the practice of forcing or accelerating the growth of plants by the application of heat, there is also that of retarding or holding back growth by means of a low temperature, artificially produced. Plants, roots, and bulbs of various kinds which have been kept in a freezing temperature for weeks or months will, when placed in a little warmth, grow and develop their flowers with the same vigour and perfection as when treated naturally. Not only many kinds of flowers but certain kinds of vegetables also, such as Rhubarb and Seakale, are successfully subjected to this treatment.

In the nursery of Mr. Thomas Rochford, near Cheshunt, there are four refrigerating

chambers of a capacity of about 65,000 cubic feet, in which roots, bulbs, &c., are stacked in single layers in such a way as to allow of a circulation of freezing air amongst them. This air is supplied by a large engine, worked by two large marine tubular boilers capable of reducing the temperature of the chambers to 90° below freezing-point; it is not, however, necessary to maintain a temperature anything like so low as this.

When the plants are removed from these chambers they are placed at first in a temperature of 45° or 50° for a few days, and kept shaded until they have made some growth, when more light and heat are afforded.

